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ASSESSMENT OF PEDAGOGICAL COMPETENCE OF ACADEMIC STAFF IN TRANSFORMATIVE DIGITAL LEARNING CONTEXT

PhD Thesis
Submitted for PhD Degree in Social Sciences

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This PhD Thesis is created within the project “Strengthening the Academic Staff of Higher Education Institutions in the areas of strategic specialization in RTA, VeA and ViA” (8.2.2.0/20/I/005).

ABSTRACT

The PhD thesis by Olga Vindača titles “Assessment of Pedagogical Competence of Academic Staff in Transformative Digital Learning Context” was developed in the field of Educational Sciences, sub-field Higher Education Pedagogy at the Faculty of Education, Languages and Design of Rezekne Academy of Technologies, under supervision of Dr. paed., professor Velta Ļubkina. The total volume of the thesis is 189 pages, 25 figures and 37 tables in the main text, as well as list of references with 297 titles and 36 appendices on 52 pages.

The bulk of research is formed on providing the clear understanding on the concept of academic staff in higher education institutions, emphasizing that teaching/learning activities have to be interconnected with research work, focusing on transformative digital learning context that has become the most challenging after Covid-19 pandemics. How to organize teaching and learning in the most effective way, combining education, research and innovation, ensuring scientific excellence. Thus, the academic staff should be equipped with the right competence, where the background is formed on the pedagogical competence in synergy with research-innovative and digital aspects.

This PhD research aims to explore the essence for the assessment and development of pedagogical competence of academic staff in transformative digital learning context in higher education institutions.

Chapter I presents a literature review on a series of pedagogical and didactical theories, offering the definitions of basic concepts and the comparative analyses of the existing didactical models of pedagogical competence in international, European and Latvian dimensions. Chapter II describes and specifies the designed didactic framework for assessment of pedagogical competence of academic staff in transformative digital learning context. Chapter III presents the findings of the empirical study undertaken within the current research and outlines recommendations and practical considerations for its effective implementation, specifying further directions of the research.

ANOTĀCIJA

Olgas Vindačas promocijas darbs "Akadēmiskā personāla pedagoģiskās kompetences vērtēšana transformatīvās digitālās mācīšanās kontekstā" tika izstrādāts izglītības zinātņu nozarē, augstskolu pedagoģijas apakšnozarē Rēzeknes Tehnoloģiju akadēmijas Izglītības, valodu un dizaina fakultātē, profesores Dr. paed. Veltas Ļubkinas vadībā. Darba apjoms ir 189 lpp., ietverot 25 attēlus un 37 tabulas, kā arī izmantotās literatūras un avotu sarakstu ar 297 nosaukumiem. Darbam papildus pievienoti 36 pielikumi uz 52 lpp.

Zinātnisko publikāciju datubāzēs ir pieejams plašs pētījumu klāsts par augstākās izglītības iestāžu akadēmiskā personāla jēdzienu, uzsverot, ka mācīšanas/mācīšanās aktivitātēm jābūt savstarpēji saistītām ar pētniecisko darbu, pievēršot uzmanību transformatīvās digitālās mācīšanās kontekstam, kas pēc *Covid-19* ir kļuvis par mūsdienu realitātes izaicinājumu, kā visefektīvāk organizēt mācīšanu/mācīšanos, apvienojot izglītības zinātnes, pētniecību un inovācijas un nodrošinot zinātnisko izcilību. Akadēmiskajam personālam jābūt noteiktām kompetencēm, kuru pamatu veido pedagoģiskā kompetence ciešā sinerģijā ar pētnieciski inovatīvo un digitālo kompetenci.

Pētījuma mērķis ir izpētīt akadēmiskā personāla pedagoģiskās kompetences vērtēšanas un pilnveidošanas būtību transformatīvās digitālās mācīšanās kontekstā augstākās izglītības iestādēs.

Promocijas darba 1. nodaļā ir sniegts literatūras pārskats par virkni pedagoģisko un didaktisko mācīšanās teoriju, piedāvājot pamatjēdzienu definīcijas un skaidrojumu, kā arī esošo pedagoģiskās kompetences didaktisko modeļu salīdzinošo analīzi par izvelētajām valstīm. Darba 2. nodaļā ir aprakstīts un precizēts didaktiskais modelis akadēmiskā personāla pedagoģiskās kompetences vērtēšanai transformatīvās digitālās mācīšanās kontekstā. Pētījuma 3. nodaļa ir aprakstīti didaktiskā modeļa aprobācijas rezultāti, secinājumi un ieteikumi vērtēšanas rīka efektīvai pielietošanai un precizēti turpmākie pētījuma virzieni.

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ABBREVIATIONS

AS	academic staff
CA	Canada
DT	digital transformation
EE	Estonia
EU	European Union
HE	higher education
HEI	higher education institution
ICT	information and communication technologies
IE	Ireland
LLL	lifelong learning
LV	Latvia
LT	Lithuania
OECD	the Organization for Economic Co-operation and Development
PC	pedagogical competence
PCAS	pedagogical competence of academic staff
TDL	transformative digital learning
UK	the United Kingdom
UNESCO	the United Nations Educational, Scientific and Cultural Organization
WB	the World Bank

INTRODUCTION

Today's society is currently facing a variety of challenges from digitalization, transformation, innovation, globalization that open up new opportunities, with information and communication technologies becoming an integral part of these processes. However, effective implementation requires conceptual approaches that both constrain and elucidate these opportunities, emphasizing the importance of education and its role in achieving personal and professional goals. The idea is manifested in reports and strategies at international, European and Latvian levels, requiring the relevant transformations.

In addition, Covid-19 pandemics has triggered the process by bringing digital transformation to the fore. The higher education sector has an essential role to play by taking the unique position at the intersection of education, covering teaching and learning, research, innovation and serving society and economy, the consistent pattern needs to be identified in synergy with the European Education Area, the European Research Area and the European Higher Education Area (European Commission, 2022). This brings the dynamics to the work of educators, in the context of higher education - academic staff, and updates the requirements, expectations and regularities. In order to ensure an effective study process in higher education institutions, academic staff must be familiar with the primary didactic tenets, which in English-speaking countries are called as teaching and learning as a background, and be ready for updating and renewal in response to the paradigm shifts, innovations, transformations, and challenges in higher education. Moreover, to actualize the potential of information and communication technologies in education, including higher education, the ability of academic staff to use them for teaching and learning is crucial, and only competent and smart academic staff can ensure the relevant transformation of teaching and learning.

The relevance in the international dimension has been explored through the official reports and documents of UNESCO, OECD, the World Bank, which indicate the direct connection of higher education to growth, future job and career, competitiveness through the preparation of professional and qualified employees and serves as an incubator for research, growth and productivity (The World Bank, 2017), while setting out the additional requirements for academic staff, including a deep and comprehensive understanding of what they teach and who they teach, in order to enhance student learning, their professional and pedagogical knowledge transforming professional practice and ensuring the creation of an effective study

environment conductive to high achievements in teaching and learning, involving an enquiry and research skills that allow academic staff to be lifelong learners and grow in their profession, requiring the high professionalism and mastery level from academic staff (Schleicher, 2018), but the increased need for skilled and professional staff and academic staff, modern economies, research and international competitiveness require systematic monitoring, evaluation and related reporting, in order to maintain a high level of mastery by developing the improved monitoring instruments and tools, defining new criteria and indicators to capture the desired achievements (UNESCO, 2021 b).

There is a need to build a future of higher education that works for everyone, considering the new trends and challenges, is resilience to external risks such as Covid-19 pandemics and goes hand in hand with innovation by implementing the necessary transformations (Schleicher, 2018), as it is an important driver of economic competitiveness in an increasingly knowledge-driven global economy, the demand for quality teaching and learning in educational institutions becomes an essential part. In addition, measuring the quality of teaching is challenging as it is directly linked to the educational achievements and helps to identify and promote good teaching practices. Also, the effective study environment can improve the quality of teaching through various means, as qualitative teaching initiatives have a noticeable impact on teaching, learning and research (OECD, 2022). While, both academic staff and students are transformed by the educational encounters as they learn from each other, so for a future perspective, pedagogy is relational. The productive tension between simultaneous individual and collective transformation determines these pedagogical encounters, both teaching and learning are nourished by and contribute to shared knowledge, requiring continuous self and professional development for both students and academic staff (UNESCO, 2021 a).

The relevance in the European dimension is reflected through the Bologna Process started in 1999, as the signing of the joint declaration established the new approaches to the work organization of higher education, with the starting point being the identification of skills and personal attitudes necessary for optimal professional competence of academic staff. Such new approaches require a renewed focus on the process of teaching, learning and research with special attention to the pedagogical aspect (Hernandez-Encuentra, Sanchez-Carbonell, 2005). Insight into the realities of higher education in general, and of academic staff in particular has, made it clear that not enough is known and studied about how academic staff are affected by such changes and transformations, as academic staff are vital to the success of higher education

(European Commission/EACEA/Eurydice, 2017), adapting to the rapidly changing world, ensuring new skills and competence needed in a multicultural, mobile and increasingly digitalized world (Navracsics, 2018). In addition, the European Strategy for Universities states that students and academic staff must be equipped with the appropriate skills such as digital, innovative and transformative; challenge-based, evidence-based, long-term, student learning-centred perspectives are cited as the most appropriate (European Commission, 2022).

The relevance in the Latvian dimension is presented in the strategic documents of Latvia, where the dynamics of the labor market and the demand for new competence and skills were indicated as changes related to global processes (IZM, 2020). The main capital is people, their competence, skills, knowledge and talents, while they should be updated in accordance with global processes, the paradigm shift in higher education and to ensure that the education system is closely linked to economic and public processes by changing the way academic staff work, therefore, traditional approaches should be replaced by more pragmatic ones, while the academic staff should additionally be a diverse and talented personality with specified skills and competences, with their continuous lifelong self and professional development and improvement in accordance to Strategy for Sustainable Development up to 2030 (Saeima of the Republic of Latvia, 2010).

According to the National Development Plan of Latvia for 2021-2027, the current situation is characterized by inextricably linked transformations in technology and society, which require fundamental changes and growth by 2027 in several areas, including higher education and science, where lifelong education is the foundation of a sustainable democratic society and scientific excellence by implementing research – innovative aspects that match the competence of the workforce, including academic staff for today's needs and future challenges as well as digital transformation with the targeted use of ICT that helps to transform existing processes, models, approaches, habits and culture in all areas and to create new ones, where the knowledge society is not only able to understand, adapt and fully utilize the new reality facilitated by digitalization, it is also the motivated, qualified and intelligent driver of a comprehensive national digital transformation (Cross-Sectoral Coordination Center, 2020).

The scientifically theoretical relevance is evolved by showing how digital transformation is reflected in education, pedagogy and didactics, how it is embedded in educational theories and which transitions were followed. Digital transformation opens up enormous opportunities for innovation, growth and independence, promotes people's global

competitiveness and stimulates creativity and cultural diversity, where the development of a modern learning environment in which everyone is motivated to learn and develop throughout their lives is emphasized, as it has been significantly expanded, providing an opportunity to learn anytime, anywhere and challenging everyone involved in the educational process (Visvizi, Lytras, Daniela, 2018).

In today's information society, in which knowledge and technology are changing ever faster, it is necessary for any educator, including the academic staff not only to prepare knowledge, but also to generate it, process it and apply it to practical areas and problems, by keeping pace with societal and technological transformation in relation to core teaching and learning elements (educator, student, content, study environment, roles, methods, approaches, assessment, etc.) (Koc, Demirbilek, Ince, 2015). So, the role of pedagogy as a driving force of education and digital transformation is to reveal the ways, methods and approaches to integrate information and communication technologies into education, including higher education. The concept of Smart pedagogy aims to define only the core directions in triangular areas, considering regular human development, the taxonomy of the educational process and technological progress, since technological progress is continuous and requires regular updates and improvements, considering the primary pedagogical tenets, placing in the center of teaching and learning a smart student (Daniela, 2018), reflecting the external influences on the process towards understanding the complex essence of learning, emphasizing the individualization and active interaction of different actors, covering educator, student, ICT, content, etc. (Žogla, 2017).

In the context of the current PhD thesis, the main actors are educators or academic staff of higher education institution with no pedagogical background, non-teacher trained academic staff (Voss, Gruber, 2006; Graham, 2015), so the concept of engineering pedagogy (Sell, Ruutmann, 2015) by forming of the conceptual frameworks for new situations and providing additional understanding in specific areas is highlighted as another transformative force.

Combining two doctrines of smart pedagogy and engineering pedagogy in the TDL context, a concept of smart educator or smart academic staff needs to be addressed to ensure the effective implementation of ICT in higher education and to provide high-level achievements and mastery level of all actors involved. So, academic staff must implement a lifelong learning approach with continuous self- and professional development, paying particular attention to pedagogical competence, which also guides students in acquiring new knowledge. Higher

education institutions should therefore focus on professional development programs in teaching and learning for academic staff to subsequently ensure a high level of mastery (Špona, 2022). Moreover, on the way to a new academic career framework and the implementation of the tenure-track system in Latvia, the high level of mastery should be ensured both in teaching and learning and in research with regard to higher education (IZM, World Bank, EC, 2022). While the current procedure for evaluating academic staff only covers the quantitative criteria in scientific and pedagogical qualification and organizational work (Cabinet of Ministers Republic of Latvia, 2021), the qualitative aspect that ensures efficiency is not considered.

Thus, the conceptual framework of the present PhD research is based on the current international and European guidelines and national development priorities of Latvia in order to strengthen the teaching, learning and research capacity of higher education institutions, to support the development orientation of the academic staff and the excellence of to promote higher education. While, the professional development aspect was examined within the defended PhD thesis of S. Baranova in 2012, covering the future education perspectives of academic staff; while the assessment aspect was examined within the defended PhD theses of A. Jurāne-Brēmane and A. Anohina-Naumeca in 2018, considering formative assessment in the study process from the perspective of students.

The problem of the research - The current European guidelines and national priorities for Latvian development indicate that the focus on growth and development of academic staff should be supported and excellence in higher education should be promoted, however the current assessment process of academic staff qualifications does not ensure this the appropriate development of pedagogical competence that facilitates the learning/teaching approach. To overcome this contradiction, the current academic career system needs to be reformed by introducing a new academic career framework in line with European and international best practices. While the main problem concerns the academic staff with no pedagogical background who are professionals in various fields like engineering, economics, etc., while they are not teacher-trained staff.

As part of the systematic and long-term continuation of the further professional work, the basic structure and development of the pedagogical competence of academic staff is being promoted, which has a decisive impact on the quality of learning/teaching. Under changing circumstances, the study environment has transformed, the impact of Covid-19 has been significant, so that new trends have emerged in content, forms, methods and approaches, which

have triggered the transformation of the study process, including the aspect of improving the pedagogical competence of the academic staff, considering smart pedagogy and engineering pedagogy as transformative forces. For this reason, the PhD thesis – Assessment of Pedagogical Competence of Academic Staff in Transformative Digital Learning Context – was selected.

The context of the research – pedagogical competence of academic staff in transformative digital learning context.

The subject of the research – the assessment of pedagogical competence of academic staff.

The aim of the research – to explore the essence for the formation and development of pedagogical competence of academic staff in the transformative digital learning context in higher education institutions.

Research Questions

1. Which didactic principles characterize the possibility of introducing the assessment of pedagogical competence of academic staff in the transformative digital learning context in higher education institutions?

2. What needs of the target group stipulate the creation of didactic framework for the assessment and development of pedagogical competence of academic staff?

3. How does the implementation of the developed didactic framework for the assessment and development of pedagogical competence of academic staff ensures the effectiveness of transformative digital learning, considering smart pedagogy and engineering pedagogy as transformative forces, in higher education institutions?

Research Tasks

1. to explore scientific approaches and theoretical findings on the didactic bases for the assessment and development of pedagogical competence of academic staff, to formulate the definition of pedagogical competence and transformative digital learning, to scientifically justify the essence and structure of pedagogical competence development in the transformative digital learning context;

2. to clarify the readiness of the target group (through three-level evaluation system) and the needs for the further development and improvement of pedagogical competence of academic staff (self-assessment, students' assessment, mastery level evaluation);

3. to work out the criteria, indicators and levels for the assessment of pedagogical competence of academic staff;

4. to develop a scientifically based didactic framework for the assessment and development of pedagogical competence of academic staff;

5. to conduct the approbation of the didactic framework for the assessment and development of pedagogical competence of academic staff and to determine the effectiveness of its implementation, considering smart pedagogy and engineering pedagogy as transformative forces;

6. to work out the guidelines for the assessment of pedagogical competence of academic staff in the transformative digital learning context.

The theoretical and methodological bases of the research consist of conceptual doctrines and findings on:

- **academic staff:** the concept of academic staff *(Houston, Meyer, Paewai 2006; Cadez, Dimovski, Groff, 2017; Videnere, Bogdanova, 2019; Vaidya et al., 2022),* including the concept of teacher-trained and non-teacher trained academic staff *(Voss, Gruber, 2006; Graham, 2015; Kersten, 2018; Ruutmann, 2020);*

- **competence and pedagogical competence:** the concept of competence (*Maslo, Tiļļa, 2005,; Chong, Cheah, 2010; Baartman, de Bruijn, 2011; Illeris, 2013; Vitello Chilingaryan, 2014; Vetello, Greatorex, Shaw, 2021*); the concept of pedagogical competence (*Apelgren, Giertz, 2010; Ryegard, Olsson, 2010; Suciu, Mata, 2011; Redecker, Johannessen, 2013; Febrianis, Muljono, Susanto, 2014; Dagar, Yadav, 2016; Aimah, Ifadah, Bharati, 2017; Sahana, 2018; Novianti, Nurlaelawati, 2019; Fakhrutdinova et al., 2020; Liu, Zhao, Su, 2022*);

- **theories for the formation of the essence and structure of pedagogical competence**: constructivism (*Sjøberg, 2010; Űltanir, 2012; Dennick, 2016; Dagar, Yadav, 2016; Taber, 2019; McLeod, 2019; Mukhalalati, Taylor, 2019, Akpan et al., 2020*); connectivism *(Siemens, 2005; Siemens, 2006; Marhan, 2006; Duke, Harper, Johnston, 2013; Herlo, 2017; Boyraz, Ocak, 2021*); activity theory (*Engestrom, 2000; Hashim, Jones, 2007; Blunden, 2015; Ploettner, Tressaras, 2016; Mikhalenko, Blayone, Žogla, Ļubkina, 2019);* smart pedagogy *(Daniela, 2018; Uskov et al., 2018, Karkazis et al., 2019; Meng, Jia, Zhang, 2020);* engineering pedagogy *(Sell, Ruutmann, 2015; Ruutmann et al., 2022);*

- **theories for the development and assessment of pedagogical competence: taxonomies of learning** *(Bloom's taxonomy - Bloom, 1956; Kolb's learning cycle – Kolb, 1975; SOLO taxonomy – Biggs & Collis, 1982; Feisel-Schmitz technical taxonomy – Feisel-Schmitz, 1986; Gibbs reflective cycle – Gibbs, 1988; Webb's Depth-of-Knowledge Model -Webb, 1997;*

New taxonomy - Marzano & Kendall, 2007; Gibbs, 2013; Hogfeldt, n.d.); teaching/learning theories *(Logvinov, 2003; Bernāte, Birziņa, Kurloviča, 2014; Petrenko, 2015; Andersone, 2017; Subakir, 2017; Žogla, 2017; Žogla, 2019 a; Schieber, 2018; Valtonen et al., 2021; Kaplan, 2021; Ruutmann et al., 2022*);

- existing frameworks for the Development of PCAS: *in international dimension*: *Recommendation concerning the Status of Higher-Education Teaching Personnel, UNECSO, 1997; The Definition and Selection of Key Competencies, 2003; Learning our lesson: Review of quality teaching in higher education, OECD Institutional Management in Higher Education, 2010; Vizag Declaration on Global Guidelines for Digital Learning, UNESCO, 2018; World Bank Group Education Strategy, 2020; OECD Education at a Glance, 2021; UNESCO Reimagining Our Futures Together 2050, 2022; Trends Shaping Education 2022, OECD;* ***in European dimension***: *EHEA, Appendix III: Overarching Framework of Qualifications of the European Higher Education Area, 2018; Modernization of Higher Education in Europe: Academic Staff -2017, Eurydice Report, EC, 2017; The European Higher Education Area in 2018: Bologna Process Implementation Report, EC, EACEA, Eurydice, 2018; The Bologna Process and the European Higher Education Area, EC, n.d.; Higher Education in Europe Report, EC, 2022; Communication from the Commission to the European Parlament, the Council, the European Economic and Social Committee on a European Strategy for universities, EC, 2022;* ***in Latvian dimension***: *Augstskolu likums, 1995; Izglītības likums, 1998; Sustainable Development Strategy of Latvia until 2030, Saeima of the Republic of Latvia, 2010; Department of Education and Skills, National Strategy for Higher Education to 2030, 2011; Digitālās ekonomikas un sabiderības indekss, DESI, 2018; Akadēmiskās karjeras ietvars Latvijai: ieceru ziņojums, EC, IZM, World Bank, 2020; National Development Plan of Latvia 2021-2027, Saeima of the Republic of Latvia, 2020; Cabinet Regulation Nr.129 Procedures for Evaluating the Scientific and Teaching Qualifications or Results of Artistic Creation Work of an Applicant for the Position of Professor or Associate Professor Holding the Position, 2021; Department of Education, Higher education policy statement & reform consultation, 2022;*

- t**ransformative digital learning context:** transformative learning theory (*founder Mezirow, 1978; updated, 1991, 1996; Taylor, Neter, Wayment, 1995; Taylor, Cranton, 2013);* digital transformation *(Tulchinskij, 2017; Elliott, 2017; Alcatel-Lucent, 2018; Visvizi, Lytras, Daniela, 2018; Uvarov et al., 2019; Dobrica, 2019; Mahlow, Hediger, 2019);* transformative

digital learning *(Mykhailenko, Blayone, Žogla, Ļubkina, 2019; Bautista, Cipagauta, 2019; Žogla, 2021; Vindača, Ļubkina, Abuže, Ušča, 2021; Špona, 2022);*

Research Methodology

Theoretical methods of analyses:

- analysis of scientific literature and scientific publications (in pedagogy, psychology, methodology) and structuring to summarize and generalize the findings on the basic questions of research (the concept of academic staff; the concept of pedagogical competence; transformative digital learning; assessment, development, and improvement of pedagogical competence);

- analysis of relevant documents in three dimensions: international, European and Latvian, through structuring in order to summarize the updated trends and requirements in the post-pandemic conditions and to generalize to the fundamental questions of research (the concept of academic staff; the concept of pedagogical competence; transformative digital learning; assessment, development, and improvement of pedagogical competence);

- comparative analyses of best practices of pedagogical competence modelling (in three dimensions: international (CA); European (DK, EE, IE, LV, UK), Latvian (LV);

-modeling of successful pedagogical competence for the assessment of academic staff;

Empirical methods:

- approbation of the developed didactical framework (three-stages design-based research);

- data collection method: self-assessment and students' assessment;

- experts interview to identify key components for the assessment of pedagogical competence of academic staff (Delphi method);

- discussion of corresponding field experts;

- method of monitoring the pedagogical process to observe the assessment in action, for the improvement of pedagogical competence (peer observation);

Methods of statistics data processing and analysis:

- Qualitative (content analyses);

- Quantitative (Kendel correlation, Kruskal - Wallis H test and Mann - Whitney test to generalize the differences, using the SPSS program; averaging).

- Triangulation of quantitative and qualitative data (triangulation is offered from the perspective of three higher education institutions: Riga Technical University (RTU), Rezekne Academy of Technologies (RTA) and Tallinn Technical University (TalTech).

Since the author of the current research analyzes the case studies of three higher education institutions to generalize the wider range of boundaries, it is therefore mixed-methods case study research.

Stages of PhD Thesis Development

Research Preparation Stage (January 2019 – September 2020)	
Theoretical Study	**Results**
• exploring and identifying the topicality of the current situation, development of the research design, research plan formation, selection of the research object, subject and theme, formulation of research questions; • analyzing the peculiarities of study environment and process in HEIs, analyses of documents; interviews of experts	• the topicality of the current situation has been explored and identified; the detailed research design and plan have been developed; the research object, subject and theme have been selected; the research questions have been formulated. • the experts of the field have been interviewed, concerning the TDL in HE, coding and processing of obtained data;
1st Stage of Research (October 2020 – January 2022)	
• theoretical analysis and systematization of scientific literature about TDL; • identification of the research field and problems related to TDL in HEIs, the analyses of its effective implementation; • the analyzes of Covid-19 pandemics impact on HE, identifying new trends and challenges from different perspectives and the necessity of transformation;	• the theoretical and scientific literature about TDL has been analysed and systemized; • research field and problems related to effective implementation of TDL have been identified; • the comparative analyses of new trends and updated challenges in HE following Covid-19 pandemics have been conducted, specifying the findings of SWOT analyses of Covid-19 impact on HE

• development of research methodology;	and identifying that TDL from the topicality become the reality of HE, therefore the **theme has been re-formulated** to the assessment of pedagogical competence of academic staff in TDL context, as pre-condition for ensuring the effective study process in HEIs; • research methodology has been developed;
2nd Stage of Research (January 2022 – June 2022)	
• theoretical analysis and systematization of scientific literature about PCAS in HE; • theoretical analysis and systematization of existing didactic framework of PCAS and good practice examples, identifying the criteria and indictors for the assessment of PCAS; • to develop a theoretically grounded didactical framework for the assessment of PCAS	• the scientifically - theoretical bases of the research has been improved according to re-formulated theme; • the theoretically grounded didactic framework for the assessment of PCAS has been developed; • criteria, indicators and descriptors for the assessment of PCAS have been developed, based on self-assessment, students' assessment and interview of experts; • comparison of the results of 1st and 2nd Stages has been conducted;

3rd Stage of Research (June 2022 – March 2023)	
• to test the didactical framework for the assessment of PCAS and to determine the efficiency of its implementation, obtaining improvements; • to develop recommendations for the implementation of the didactical framework for the assessment of PCAS in HEIs; • summarizing, analyses and interpretation of research findings; • to formulate thesis for defense;	• the didactical framework for the improvement of PCAS has been approved; the efficiency of its implementation has been determined, including the interview of experts; • processing of research results with SPSS; interpretation of research results; • the recommendations for the implementation of the didactical framework for the assessment of PCAS in HEIs have been specified; • thesis for defence has been formulated

Research Background

1. An online survey was conducted from February 2019 to April 2019, according to the scale "Attitude towards information technologies" in Latvian higher education institutions: Rezekne Academy of Technology, University of Latvia, Daugavpils University Medical College, State Border Guard College, a total of 219 respondents, including 39 academic staff and 180 students.

2. An interview "Practical application of transformative digital learning" was organized in December 2019 for the representatives of Latvian higher education institutions within the fundamental and applied research project “Implementation of Transformative Digital Learning in Doctoral Program of Pedagogical Science in Latvia” (DocTDLL). No. lzp-2018 / 2-0180. The following institutions were listed: University of Latvia, Liepaja University, Rezekne Academy of Technology, Daugavpils University, Latvian Academy of Sports Pedagogy. 10 experts took part in the interview.

3. An online questionnaire was conducted in March 2020 on Self-Assessment of Digital Competence in Latvian Higher Education Institutions for Doctoral and Master's

Students: Rezekne Academy of Technology, University of Latvia, Daugavpils University, a total of 30 respondents, including 14 doctoral students and 16 master students.

4. An online questionnaire was conducted in June 2020 on Latvian experience and problems followed by Covid-19 in four main aspects: study environment, organization of study process, competences and IT-Human dialogue, in Latvian Higher Education Institutions, including students and educators of engineering, social and human studies, a total of 93 respondents, including 69 students and 23 academic staff were participated.

5. Erasmus+ Mobility trip to Tallinn Technical University was organize in March 2022, to get acquainted with the assessment procedure of pedagogical competence of academic staff in TalTech, covering the following aspects: content, methods, procedure, outcomes, reflection.

6. An interview of academic staff was organized in April 2022 within the RTU Methodological Conference "the Enhancement of Pedagogical Competence of Academic Staff: Content, Methods, Experience", concerning two aspects: core elements of pedagogical competence of academic staff and the value-added assessment of it, 60 experts of RTU took part in the interview.

7. Peer observation was conducted within the personal work of the researcher as an expert in tenure project in RTU, starting from July 2023, filling in the prepared form for the evaluation of the candidate to tenure-track position.

8. The Competence Research was organized in RTU in October 2022 to determine the core competences of academic staff in two perspectives: in own work and in the work of colleagues, two aspects were used within the research: teaching and learning; and effective ICT use.

Research Sample

In Latvia: Riga Technical University (RTU), Rezekne Academy of Technologies (RTA);

Abroad: Tallinn Technical University (TalTech).

The effectiveness of the developed framework was tested within **RTU ERASMUS+ project** Transformative Digital Pedagogies for Higher Education TDP4HE (Nr. 2022-1-LV01-KA220-HED-000085277) in September 2022. Ten experts from **Cyprus, Rumania, France, Ireland and Latvia** took part in the questionnaire and discussion, reflecting the ideas of both perspectives: students and AS.

Scientific Novelty of PhD Thesis

1. the formation of pedagogical competence of academic staff and its common pattern has been studied and theoretically justified by offering the definition of the pedagogical competence of academic staff in higher education institutions;

2. the context of transformative digital learning has been captured and the need for its implementation in higher education has been identified by offering the definition of transformative digital learning and the primary tenets for its effective implementation;

3. the theoretically grounded and approved through pedagogical good practices of international (perspective of Canada), European (perspectives of Denmark, the UK, Ireland, Estonia and Lithuania) and Latvian perspectives, the conceptual framework was developed, emphasizing the transformation of higher education pedagogy, considering smart pedagogy and engineering pedagogy as driven forces;

4. based on the conceptual framework, theoretically grounded didactical framework for the assessment of pedagogical competence of academic staff has been developed, with the focus on non-teacher trained academic staff;

5. criteria and indicators for the assessment of pedagogical competence of academic staff for three perspectives: self-assessment, students' assessment and mastery level evaluation, have been developed, with the focus on non-teacher trained academic staff;

6. methodology for the value-added assessment of the pedagogical competence of academic staff has been established, including the descriptors for each indictor based on three-level approach, considering basic, intermediate and mastery levels and providing the tool for mastery level evaluation by mapping the background for further development of pedagogical competence,

Practical Significance of PhD Thesis:

1. the approbation of the didactic framework for the assessment of pedagogical competence of academic staff in the transformative digital learning context in higher education institutions was conducted;

2. the developed criteria, indicators and descriptors for the pedagogical competence of academic staff provide an opportunity to determine the level of these from three perspectives:

self-assessment, students' assessment and mastery level evaluation for further improvement planning, focusing on non-teacher trained academic staff;

3. guidelines for the introduction and implementation of assessment tools such as self-assessment, students' assessment and mastery-level evaluation to assess the pedagogical competence of academic staff in the transformative digital learning context have been prepared for use in higher education institutions.

Research Boundaries:

The PhD thesis was developed in the field of education sciences, the sub-discipline - higher education pedagogy. The core features of higher education institutions in terms of effective work of academic staff have been studied, based on the author's experience in several research project in higher education, including the implementation of tenure-track project in Riga Technical university, where high-level mastery of academic staff is required. The empirical research was conducted in Riga Technical university, Rezekne Academy of Technologies and Tallinn University of Technology (total 25 academic staff and 62 students in December-January 2022 questionnaire), ensuring data triangulation. The improvement and development of pedagogical competence of academic staff to ensure the effectiveness of the study process in higher education institutions was examined as a part of the current PhD thesis and provides the didactic framework for the assessment of the pedagogical competence of academic staff in the transformative digital learning context, focusing on non-teacher trained academic staff, professionals of the related field while without pedagogical background.

Approbation of PhD Thesis Results

Scientific Publications

1. Vindača, O., Ļubkina, V. (2023). Assessment of Pedagogical Competence of Academic Staff: Criteria and Indicators.// 17th International Technology, Education and Development Conference (INTED23) Proceedings, 6-8 March, 2023, Spain. (offered for indexing in Web of Science), ISBN: 978-84-09-49026-4.

2. Vindača, O., Ļubkina, V. (2022). Transformational Challenges for Pedagogical Competence: the Perspective of Academic Staff.// 14th International Conference on Education an New Learning Technologies (EDULEARN22) Proceedings, 4-6 July 2022, Spain,

https://doi.org/10.21125/edulearn.2022.0500 (Web of Science), ISBN: 978-84-09-42484-9.

3. Vindača, O., Ļubkina, V. (2021). Renewed Trends in Higher Education Following Covid-19.// 14th International Scientific Conference Society. Integration. Education (SIE2021) Proceedings, 28-29 May 2021, RTA. https://doi.org/10.17770/sie2021vol1.6322 (Web of Science), ISSN: 1691-5887.

4. Vindača, O., Ļubkina, V. (2021). Digital Competence Structural Model in the Context of Higher Education Institutions Following COVID-19 Renewed trends.//13th International Conference on Education an New Learning Technologies (EDULEARN21) Proceedings, 5-6 July 2021, Spain, **doi:** 10.21125/edulearn.2021.0265 (Web of Science), ISBN: 978-84-09-31267-2.

5. Usca, S., Mykhailenko, O., Abuze, A., Vindaca, O., Desyatnyuk, O. (2021). Learning for Gender Equality in Post-Industrial Economy: an Online Program Overview. RTA journal Education Reform: Education Content Research and Implementation Problems. RTA, 2021. http://journals.ru.lv/index.php/ER/article/view/5417 (Web of Science).

6. Vindača O., Ļubkina V. (2020). Transformative Digital Learning in the Context of Higher Education: Definition and Basic Concepts. // Rural Environment. Education. Personality. Proceedings of the International Scientific Conference, Volume 13. - Jelgava: Latvia University of Life Sciences and Technologies, 2020. – pp.177-184. https://doi.org/10.22616/REEP.2020.021 (Web of Science).

7. Vindača O. (2020). Transformative Digital Learning in the Context of Higher Education: Comparison of Traditional and Transformative Concepts. // Society. Integration. Education. Proceeding of the International Scientific Conference, Volume IV. – Rezekne, 2020. – pp. 691-700. http://dx.doi.org/10.17770/sie2020vol4.4994 (Web of Science).

8. Vindača O., Ļubkina V., Žogla I., Prudņikova I. (2020). Effective Digital Transformation in the Context of Higher Education.// 12th International Conference of Education and New Learning Technologies. Proceedings. – online Spain, 2020. – pp. 1027-1036, https://library.iated.org/view/VINDACA2020EFF (Web of Science), ISBN: 978-84-09-17979-4.

9. Vindača, O., Abuže, A. (2020). COVID-19 Impact on Higher Education – the Trigger for Digital Transformation: Case Study.// 13th International Conference of Education, Research and Innovation (ICERI2020). Proceedings. – online Spain, 2020. doi:10.21125/iceri.2020.0619 (Web of Science), ISBN: 978-84-09-24232-0.

10. Vindača, O. (2019). Digital competence in the context of learning conceptual aspects in higher education institutions. Education Reform: Curriculum Research and Implementation Challenges 2019 (1). RTA, https://doi.org/10.17770/er2019.1.4213 (EBSCO database).

The results of the research were reported at conferences, forums:

1. 06th-8th March 2023 - 17th Annual International Technology, Education and Development Conference (ITED23), Spain. Participation with paper " Assessment of Pedagogical Competence of Academic Staff: Criteria and Indicators", co-author V. Ļubkina.

2. 04th-6th July 2022 - 14th International Conference on Education an New Learning Technologies (EDULEARN21), Spain. Participation with paper "Transformational Challenges for Pedagogical Competence: the Perspective of Academic Staff ", co-author V. Ļubkina.

3. 26th – 27th of May scientific conference of Liepaja University "Pedagoģiskās inovācijas mācīšanās un mācīšanas procesā" with presentation "Modern Concepts of Pedagogical Competence of Academic Staff".

4. 12th of April 2022 – Riga Technical University Methodological Conference "The Enhancement of Pedagogical Competence of Academic Staff: Content, Methods, Experience", Riga Technical University with presentation "Pedagoģisko kompetenču ietvari – ko izmantosim RTU?", co-author V. Ļubkina;

5. 5th-6th July 2021 - 13th International Conference on Education an New Learning Technologies (EDULEARN21), Spain. Participation with paper "Digital Competence Structural Model in the Context of Higher Education Institutions Following COVID-19 Renewed trends", co-author V. Ļubkina.

6. 28th-29th May 2021 - 15th International Scientific Conference Society. Integration. Education (SIE2021), RTA, Latvia. Participation with paper "Renewed Trends in Higher Education Following Covid-19", co-author V. Ļubkina.

7. 28th-29th May 2021 - 15th International Scientific Conference Society. Integration. Education (SIE2021), RTA, Latvia. Participation with paper “Life with Covid-19: SWOT Analyses for Transformative Digital Learning in Educators’ Perspective”, co-authors: V. Ļubkina, A. Abuže, S. Ušča.

8. 9th-11th November 2020 – 13th International Conference of Education, Research and Innovation (ICERI2020), Spain. Participation with paper “COVID-19 Impact on Higher Education – the Trigger for Digital Transformation: Case Study”, co- author: A. Abuže.

9. 6th-8th of July, 2020 - 12th Annual International Conference on Education and New Learning Technologies, Palma de Mallorca, Spain. Participation with paper “Effective Digital Transformation in the Context of Higher Education”, co-authors: V. Lubkina, I. Žogla, I. Prudnikova.

10. 22-23rd May, 2020 -14th International Conference "Society. Integration. Education", RTA, Latvia. Participation with paper “Transformative digital learning in the context of higher education: comparison of traditional and transformative approach”.

11. 08-09th of May, 2020 - 13. International conference “Rural environment. Education. Personality. - (REEP-2020)”, Jelgava. Participation with paper “Transformative Digital Learning in the Context of Higher Education: Definition and Basic Concepts”, co-author: V. Lubkina.

12. Education Forum on the future and exchange of good practices, Academy for Good Governance in Bulgaria, October 8-11, 2019, with a presentation by V. Lubkina, O. Vindacha “Digital competence in the context of learning conceptual aspects in higher education institutions”.

13. 26th of April 2019, RTA students' scientific conference "Personality. Time. Communication" with a report "Digital competence in the context of learning conceptual aspects in higher education institutions".

Monographs:

1. Vindača, O., Ļubkina, V. (in I. Žogla (Eds.), (2021). Monograph - Latvian Council of Science Fundamental and Applied Research Project Implementation of Transformative Digital Learning in Doctoral Program of Pedagogical Science in Latvia (DocTDLL), lzp-2018/2-0180 project monograph - Section 3.3. Case study 3. O.Vindača & V. Ļubkina. Digital Transformative Learning in the Context of Higher Education Following Covid-19 in Latvia.

Projects and Other Activities

1. 25.07.2022 till present – Riga Technical University, Administrative Director Department, Human Resources department - expert (tenure-track project);

2. 01.12.2022 till present – Riga Technical University- Study department – researcher (RTU ERASMUS+ project Transformative Digital Pedagogies for Higher Education TDP4HE (Nr. 2022-1-LV01-KA220-HED-000085277);

3. 01.02.2022 till present Rezekne Academy of technologies lecturer-researcher (within the project "Strengthening the Academic Staff of Higher Education Institutions in the areas of strategic specialization in RTA, VeA and ViA" (8.2.2.0/20/I/005);

4. 01.02.2022 -31.01.2023 – co-lecturer of study course Quality of Education at Rezeknes Academy of Technologies.

5. 10.04.2022 till 30.11.2022 Rezekne Academy of Technologies ERASMUS+ project "Transformative digital learning for general education following Covid-19 impact" Nr. 2021-1-LV01-KA220-SCH-000032781 – coordinator, researcher.

6. 01.09.2019 – 31.05.2021 - LZP applied research project "Implementation of Transformative Digital Learning in Doctoral Program of Pedagogical Science in Latvia" (DocTDLL) proj. No. lzp-2018 / 2-0180proj. - PhD student researcher.

7. 01.05.2021- 17.09.2021 - Rezekne Academy of Technologies ERASMUS+ Strategic Partnership project "Adult self-learning: supporting learning autonomy in a technology - mediated environment" Nr. 2019-1-TR01-KA204-076875, coordinator, researcher.

8. 01.09.2020 – 17.09.2021 Rezekne Academy of Technologies Research Institute for Regional Studies, secretary, researcher.

9. 01.09.2020 – 17.09.2021 Rezekne Academy of Technologies International Scientific Conference "Society. Integration. Education" (SIE2021), chairman of organizing committee, co-editor.

10. 20.06.2019 RTA professional development program "Transformative digital learning: theory and practice".

11. 05.-07. 12.2019 - LZP applied research project "Implementation of Transformative Digital Learning in Doctoral Program of Pedagogical Science in Latvia" (DocTDLL) project Nr. lzp-2018/2-0180 seminar, participation in approbation of results (doctoral student's

competence development table for self-assessment; Questionnaire "Study process in higher education institutions").

12 19.06.-20.06.2019 summer school within LZP applied research project "Implementation of Transformative Digital Learning in Doctoral Program of Pedagogical Science in Latvia" (DocTDLL) project Nr. lzp-2018/2-0180 and the project of the Latvian-Ukrainian cooperation program "Gender aspects of digital readiness of human capital in regions" No. LV-UA/2018/3.

13. 01.02.2018 – 31.08.2019 - LZP applied research project "Implementation of Transformative Digital Learning in Doctoral Program of Pedagogical Science in Latvia" (DocTDLL) project Nr. lzp-2018/2-0180 - Master student researcher.

Structure of the PhD Thesis:

The PhD thesis consists of several sections: introduction, three chapter integrating the theoretical background and case study research, and provides the designed and developed didactical framework for assessment of pedagogical competence of academic staff and assessment tools for the process management, conclusions, bibliography and appendices.

In Chapter 1 of the PhD thesis, the author provides the epistemological analysis of the terms ‘academic staff’, ‘non-teacher trained academic staff (with no pedagogical background)’, ‘teacher trained academic staff (with pedagogical background)’ ’competence’, ’pedagogical competence’; formulates the definition of ’pedagogical competence of academic staff’ and selects and highlights its substantive components through analysis of theories and practices for pedagogical competence mapping. The first chapter deals with the transformative digital learning context and its implementation in higher education institutions, considering smart pedagogy and engineering pedagogy as transformative forces. The offered definition of the pedagogical competence of academic staff is specified in the transformative digital learning context.

Chapter 2 focuses on the procedure for determining the pedagogical competence of academic staff in general, while the proportion of different criteria and indicators for the assessment of non-teacher trained academic staff being specified in more details. The didactic framework for the assessment of the pedagogical competence of academic staff is offered as background information on the basis of primary tenets of two doctrines of smart pedagogy and engineering pedagogy and covers the implementation process in the transformative digital

learning context. In addition, three types of assessment tools are defined: self-assessment, students' assessment and mastery-level evaluation, which form the common pattern of the assessment procedure of pedagogical competence.

In Chapter 3 of the PhD thesis, the author describes the case study to confirm the effectiveness of the didactic framework for the assessment of pedagogical competence of academic staff, covering the pilot research analyses, research methodology and design, data collection procedures and data processing with SPSS program, elaboration of the guidelines for the implementation of value-added assessment of pedagogical competence of academic staff in higher education institutions, considering smart pedagogy and engineering pedagogy as transformative forces.

The total scope of the PhD thesis is 189 pages, 25 figures and 37 tables in the main text, as well as a list of bibliographic sources with 297 titles and 36 appendices.

1. THEORETICAL BASES FOR THE FORMATION OF PEDAGOGICAL COMPETENCE OF ACADEMIC STAFF

Chapter 1 focuses on the scientifically – theoretical foundations of the formation of pedagogical competence of academic staff (PCAS). Firstly, the concept of academic staff (AS) of higher education institutions (HEIs) is examined in three specified dimensions: international, European and Latvian, justifying the essential points such as definition of AS, the key functions and activities of AS, ranks systems and career path and further perspectives for the development of higher education (HE) in terms of AS and academic career planning and highlighting the core aspects such as paradigm shift in education, information and communication technologies (ICT) in education and its effective application in digital transformation (DT), lifelong learning (LLL). It then examines the definition and structure of the pedagogical competence (PC), specifying the notion of competence in higher education (HE); the concept of competence in the context of AS, which includes three core elements of knowledge, skills and psychosocial factors; the conceptual formation of the PC structure, emphasizing the cycle nature with the following teaching/learning stages: practice/implementation, observation/examination, theory and planning/preparation; the comparative analyses of pedagogical competence concepts and frameworks from several perspectives. Subsequently, the implementation of pedagogical competence through pedagogical theories is examined, specifying previous experience as a core aspect for the further development through such theories as constructivism, connectivism and activity theory; and examples of good practices in Latvian, European and International dimensions. The comparative analyses of Latvian, Lithuanian, Estonian, Danish, British, Irish and Canadian perspectives are shown in the specified aspects. Finally, the transformative digital learning (TDL) context is justified in the formation of PCAS, covering the primary tenets by drawing parallels with traditional and transformative approaches, and considering the further steps of its effective implementation within the scope of modern trends and challenges in HE.

1.1. Concept of Academic Staff in Higher Education Institutions

To be successful, any organization or institution, including HEIs must be flexible to allow an adjustment in processes to meet changing world demands. They must, therefore, have staff that possess the competence and training required to perform a range of different tasks, so they have to be capable, dedicated, flexible, creative, innovative and even talented (Manna, 2008).

The successful development of any HEI is based on the professional work of its employees. As the changes and challenges take place at an accelerating pace, new rules are created for organizations, institutions and human resources that impact HEIs and AS (Schwartz et al., 2017). So, increased attention should be paid to the development of appropriate groups of competence of the staff in order to improve and strengthen them, as a predisposition to meet the demands of today's world and achieve excellence in the selected fields (Lakstigala, Balina, 2019), for AS in HEIs, professional and pedagogical competence, knowledgeability and even wisdom become transforming forces for appropriate respond to the challenges of DT (Žogla, 2021).

The relevance and importance of the study was highlighted in three dimensions: international, European and Latvia, by the World Conference on Higher Education (2009), the European Commission/EACEA/Eurydice Report (2017), the World Bank Group Education Strategy (2020), OECD Education at a Glance Reports (2021; 2022), UNESCO Education 2030 (2015), UNESCO Reimagining Our Futures Together 2050 (2022).

Moreover, HEIs play an important role in achieving the European Education Area (Conze, Meehan-van Druten, 2020) and the European Research Area (Gabriel, 2021), in synergy with the European Higher Education Area (European Commission, n.d.), paying special attention to AS for adopting to changing conditions, achieving vital success and excellence. As HEIs have a unique position at the crossroads of education, research, innovation, serving society and economy, and are key actors to promote the European model in line with interests and values of EU, as well as international and national norms and standards (European Commission, 2022). The present PhD research focusses on the AS of HEIs, so the definition of AS needs to be clarified first.

Definition of Academic Staff

In international dimension, according to International Standard Classification of Education the AS is specified as personnel whose primary assignment is instruction, research, or public service, holding an academic rank with titles such a professor, associate professor, assistant professor, instructor, lecturer, or the equivalent of any of these academic ranks (UNESCO, 1997). Additionally, the category includes personnel with other titles such as dean, director, associate dean, assistance dean, chair or head of the department (UNESCO/OECD/Eurostat, 2001), while the focus of the current PhD thesis is on the first category.

In the European dimension, the basic definition of AS, according to the strategic documents of EC, is directly linked with teaching and learning, but it can also be fragmented and segmented according to the employment status, rank, type of main activities: research, teaching/learning, management and leadership. As the educational process becomes more complex and specified, so the objectives and the tasks for AS have to be transformed (European Commission/EACEA/Eurydice, 2017).

In the Latvian dimension, Education Law of the Republic of Latvia specifies the educator/teacher as a natural person who has the education and the professional qualification specified in the state legislation and participates in the implementation of an educational program at an educational institution (Izglītības likums, 1998). While AS of HEI is specified as employees of the relevant HEI elected to academic positions (Augstskolu likums, 1995).

Despite only two main categories of AS: type of employment and type of main activities, the AS of HEI conducts complex work in an increasingly demanding environment. Traditionally, HEIs have defined the key activities/functions of AS according to the three domains of teaching, research, and service, with primary emphasis on teaching and research aspects and secondary emphasis on service or administration (Houston, Meyer, Paewai, 2006). Additionally, the emphasize depends on research performance where the core elements are creativity and innovation in teaching/learning (Cadez, Dimovski, Groff, 2017).

Then nowadays the core meaning concerning teaching and research is kept the same, while expanding it through learning and organizational work. There is more emphasis on learning and less on teaching (Vidnere, Bogdanova, 2019), which requires the minimum prescribed qualification and educational background (Vaidya et al. , 2022). Besides teaching/learning and research, the other competence groups of AS are specified: community engagement (The World

Bank, 2017), internationalization, which covers the compatibility of qualifications from AS and HE systems across Europe (European Commission, 2022), by equally committed to the transmission of knowledge through teaching and at the same time producing new knowledge through research with the linkage between them (European Commission/EACEA/Eurydice, 2017).

Moreover, AS shall take an active part in the management and decision-making processes of HEIs, in order to implement DT and innovations. Additionally, the scope of the tasks of the AS shall be determined by a HEI, that is specified in the Constitution of each HEI (Jermolajeva, 2007), by participating in the formulation of the decisions of the management and self-governance of a HEI and the formulation of the internal legal acts in accordance with the constitution of a HEI, and also to take part in the making of decisions related to the interests of the AS (Brigmane, 2018).

The activity balance of AS is presented in Figure 1.1 by combining teaching and learning and research while considering innovative digital transformation in the TDL context that is linked to smart pedagogy and engineering pedagogy (see sub-chapter 1.3. and 1.4.).

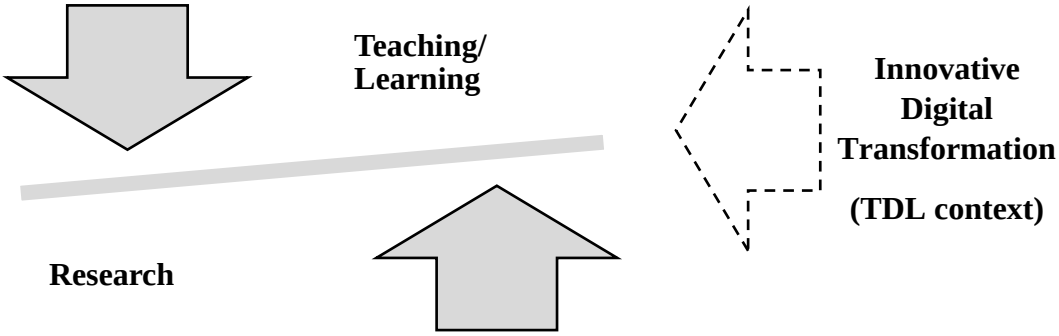


Figure 1.1 **Activity Balance of Academic Staff** (researcher's concept)

The two types of AS are offered within the current PhD thesis, while the focus of the current research is on AS engaged mainly in engineering fields and working in technical universities, therefore non-teacher trained AS will be analyzed further.

By analyzing several authors (Graham, 2015; Kobayashi et al., 2017; Rajathi, Kumar, Tamilmani, 2017, Kersten, 2018) concerning teaching/learning ability of AS in engineering field it is concluded that despite their high academic qualifications, the teaching quality should

be improved, therefore there is a need to include planning, implementation, and evaluation of teaching and learning in engineering education.

Moreover, Voss and Gruber (2006) indicate that having an attitude that best promote learning of students is the most important aspect of pedagogical competence (PC) and is more implemented in teacher-trained educators than in non-teacher trained educators (Voss, Gruber, 2006). Still the need of continuous improvement and development is required to achieve the quality of teaching/learning in engineering education (Kersten, 2018). Moreover, any academic understand the importance of high-quality teaching as a part of their academic career (Graham, 2015).

Thus, two-types of educators were specified within the current PhD research: teacher-trained educators (with pedagogical background) and non-teacher trained educators (with no pedagogical background), while the emphasize of the current research was on non-teacher trained educators. It is important to note that in pedagogical theories the term educator or university teacher is specified (Voss, Gruber, 2006; Kersten, 2018) , while in the strategic documents (European Commission/EACEA/Eurydice, 2017) and state legislation (Saeima of the Republic of Latvia, 2020) the term academic staff is used, so further the same terms will be applied.

But how to combine teaching/learning with research, this aspect is directly linked to the career paths of the AS, which are related to the ranks system of each country.

Ranks System of Academic Staff

Despite the differentiation of academic ranks that exists in different countries and regions, still there are some common features in academic hierarchies, where the highest ranks are associate professor and professor, while the academic career can be started with such ranks as associate lecturer/teacher/professor, lecturer/instructor, senior lecturer (Wang, Teter, 2017). Every country has a specific ranks system, by offering one unique version for their national HE system (Frolich et al., 2018). Moreover, AS is a heterogeneous group in European HE, so the degree of difference in AS categories from one country to another is a striking feature of the European higher education landscape (European Commission/EACEA/Eurydice, 2017). By drawing parallels in the same three dimensions: international, European and Latvian, the cross-analyses of career paths are presented in Table 1.1, reflecting the academic ranks system in the following countries: Canada (CA), Denmark (DK), the United Kingdom (UK), Ireland (IE), Lithuania (LT), Estonia (EE) and Latvia (LV).

Table 1.1

Career Path by Country (created by researcher)

LV	DK	UK	IE	EE	LT	CA
Assistant	-	Teaching assistant / Research assistant	Part-time teaching assistant	-	Assistant/ Junior research staff	-
Lecturer/ researcher	-	Teaching fellow/ Research fellow	Lecturer below/above the bar	Teacher	Lecturer/ Research staff	Postdoc/ Instructor
Assistant professor/ Senior researcher	Assistant professor/ Researcher	Lecturer/ Senior lecturer/ Senior research fellow	Senior lecturer	Lecturer	-	Assistant professor
Associate professor	Associate professor/ Senior researcher	Principal lecturer/ Principal research fellow	Associate professor	Associate professor	Associate professor/ Senior research staff	Associate professor
Professor	Professor/ Professor with specific responsibilities	Professor /Function head/ Head of school	Professor	Professor	Professor/ Chief research staff	Full Professor
(European University Institute, Latvia, 2018)	(European Commission /EACEA/Eurydice, 2017)	(Universities UK et.al., 2011)	(European University Institute, Ireland, 2018)	(European University Institute, Estonia, 2018)	(European University Institute, Lithuania, 2018)	(ca.indeed.com, 2021)

Summing up, the career path for the chosen countries is similar as it covers as the teaching/learning as the research activities, providing the possibility both to separate and to combine them, by following a research-based route, a teaching-based route and combined research and teaching route (Schwartz, Strawn, Sarna, 2018). Besides this, HEIs determine the strategic specialization of the institution in order to achieve internationally recognized excellence and compliance with the needs and requirements of the society in the chosen fields of science in the study and research activities (Frolich et al., 2018). While in the current PhD research the engineering field and technical universities are emphasized. Despite the option to combine research-based and teaching-based routes additional management tasks and

experiences can be added (Zacher et al., 2018), while a clear understanding of further career development is essential to achieve excellence in the specified field. Despite the fact, that traditionally, AS combines the tasks of research and teaching, with research informing their teaching, still there is a possibility to divide AS into staff who are research intensive, teaching intensive and the 'traditional' academic who combines the tasks of research and teaching (Broadbent & Strachan, 2016).

In the Latvian dimension, it is recommended to combine research and teaching, and to offer ranks such as professors, associate professors; docents, senior researchers; lecturers, researchers; assistants (Augstskolu likums, 1995). As the further career development of AS is reflected in the strategic documents, the future perspectives of HE were analyzed in the same three dimensions.

Future Perspectives of HE

In international dimension, the UNESCO, the global leader of education, report of Education 2030 has highlighted the necessity of recalibrating careers in academic, offering the discussion about the future role of the academic profession – one that effectively balances quality teaching, research and service. Each of these three pillars is fundamental to the academic profession and to addressing the complex global challenges (Wang, Teter, 2017). Furthermore, the updated UNESCO report covers the necessity to renew the mission of HE. That means to have strong connection with the previous levels of education and to engage in pedagogical strategies beyond the traditional approaches and methods. To move pedagogy back to the foreground, by providing greater value to the teaching work of AS and support their pedagogical learning and growth by implementing the corresponding transformations (de Sousa (Eds.), 2021).

The idea is not new as the necessity to be adopted to the faced changes and challenges, paying attention to the quality of education, people's knowledge, skills, competence to promote continuous development have been specified for time being. Moreover, the monitoring of teaching and learning is weak enough in HE the necessary enhancements have to be conducted and implemented (The International Bank for Reconstruction and Development/ The World Bank, 2011).

As HE is directly linked with growth, future job and career as well as competitiveness, so it has the potential to serve as a catalyst for innovative digital transformation and economic growth. The HE system sits at the apex of the education systems, supporting the lower levels of

education and preparing professional and skilled employees (Troscianko, Bray, 2018), and serving as an incubator for a research (Brigmane, 2018). It can serve the community by contributing knowledge and advanced skills as well as basic competence and research. Knowledge plays a growing role in the global economy, driving economic growth and productivity (The World Bank, 2017). To enlarge the opinions, the causes of academic career failures were analyzed, two points have been highlighted: self-efficacy (Curtin, Malley, Stewart, 2016) and academic system itself (Troscianko, Bray, 2018).

If self-efficacy, covering continuous self-development, depends on the individual (Curtin, Malley, Stewart, 2016) then the reasons of academic system failures should be looked through the strategic documents and official as international as state reports. That is to explore the aspects, ensuring the effectiveness of academic system, including the growing demand for HE, the roles of access, including equity, the quality and relevance of teaching and its implications for employability, the role of research and development in HE and the role of systems reform within HE (UNESCO, 2021 b). Furthermore, the same idea of systematic monitoring, evaluation (Cadez, Dimovski, Groff, 2017) and associated reporting is required. For achieving this, the improved monitoring tools (Laska, 2016) have to be designed, defining new clear criteria and indicators to capture the desired outcomes (Brigmane, 2018). The assessment and evaluation aspect, covering the criteria and indicators development are analyzed in Chapter 2 of current PhD research.

Similar ideas and aspects are observed *in European dimension*, where HEIs have a unique position at the crossroads of education, research, innovation, serving society and economy. As this is extremely important in a quickly changing world, facing major challenges and providing excellence and transformation. As skills and competence needs are rapidly evolving, the higher education sector has to adapt. Students and AS need to be equipped with the corresponding digital, innovative and transformative competence (European Commission, 2022).

To form a clear view of the future perspectives, there is a need to conduct comparative analyses of the strategic documents of the appointed countries: Canada (CA), Denmark (DK), the UK(UK), Ireland (IE), Lithuania (LT), Estonia (EE), and Latvia (LV). By analysing the strategic documents of the specified countries of good practices examples and considering the Latvian direction as a background, the three future perspectives in the context of HE have been highlighted: paradigm shift (Jacobs, Farell, 2001; Blūma, 2016), effective ICT implementation (DT) (Elliott, 2017, Alcatel-Lucent, 2018; Dobrica, 2019; Zogla, Prudnikova, Mykhailenko,

2019); and lifelong learning (LLL) (Ates, Alsal, 2012; Fernāte, Birziņa, Kurlovičs, 2014). Let's deal with each of the specified perspectives.

Historian and philosopher of science as well as the author of paradigm idea T. Kuhn considers ***the paradigm shift*** as a scientific revolution with abstracted rules, where the pre-paradigm period is fundamental with deep debates over legitimate methods, approaches, standards, solutions, organization of work, study environment etc. (Kuhn, 1962). As soon as there is a fundamental change in the understanding of a field of study a paradigm shift occurs. Therefore, the term paradigm shift matches with the idea of any change in the specified field (Gómez-Diago, 2020). Usually, new paradigms emerge as the result of tradition-shattering revolutions in the thinking of a particular professional community, involving the adoption of a new outlook, by attempting to implement change in a holistic way, the chances of success greatly increase (Jacobs, Farrell, 2001). For the current PhD research, the paradigm shift is analyzed in the context of AS of HEIs.

For a clear understanding of paradigm shift in HE the core components have to be specified: the role of learners/students; learner/student-centered or learning-centered/ student learning-centered instruction (Weimer, 2002; Attard et al., 2010; Žogla, 2019 b); the learning process; process-oriented instruction (Scott, 2010; Schwarz, Strawn, Sarna, 2018); diversity among learners and viewing these differences as resources to be recognized, catered to and appreciated (Hjørland, 2008); individual differences of students, personalization (Bray, McClaskey, 2013); internal views, from outside, considering innovations as qualitative research (Pavlik, 2015); education connection with the world beyond as a means of promoting holistic learning; helping students to understand the purpose of learning and develop their own purposes; a whole-to-part orientation instead of a part-to-whole approach; an emphasis on the importance of meaning rather than drills and other forms of rote learning; a view of learning as a lifelong process (Jacobs, Farrell, 2001).

So, paradigm shift in HE, provide the replacement of the traditional approach with more pragmatic approach where the context of acquisition of knowledge is important. Thus, the AS should be a diverse and talented personality, with specified skills and competence (Blūma, 2016). The study process of HEIs according to student learning-centered paradigm is specified in Table 1.2, where the replacement of core elements is specified.

Table 1.2

Student Learning-Centered Paradigm

(adopted from (Schieber, 2018) researcher's concept)

Paradigm Shfit	**Networked age**	
Idea	Student/learner-centric: all components are designed for the education experience to be adaptable to the needs and potential of each learner and supports the highest possible outcomes for each and every learner	
Core components	Learning	- personalized learning that is competence-based, considering learner interests, strengths and readiness level, and has a range of learning environments and roles; - learning experiences enable learners to develop their knowledge, skills, and dispositions in a relevant and contextualized manner; - learners are embedded in a network of stable and supportive relationships and are encouraged to learn through self-directed discovery, with the peers and under facilitating; - ensuring meaningful learning with flexible time, pace, space, resources, methods and approaches; - learning is the core focus, the process itself;
	Roles	- a range of learning roles; - student/learner and educator/teacher work together, considering how, when and what is learnt;
	Assessment	- performance-based assessment of outcomes; - measurements tools are aligned with the nature of learning; - online evaluation and assessment as option.

In addition to the specified core components cover learning, roles and assessment, the effective study environment both offline and online is considered, by combining face-to-face instruction and online learning (Pavlik, 2015).

Nowadays, innovative uses of emerging technologies are enabling a fundamental transformation of the teaching and learning process and has been a trigger for the paradigm shift in education. Fueling this transformation is the confluence of technological developments, the seeds of which were planted more than three decades ago. The idea of the emerging digital learning paradigm has been offered by USA professor John V. Pavlik as far back as 2015. While, technology, no matter how advanced, does not guarantee better education. While, the promise

of an engaged community of lifelong learners is within sight. So, HE should become a process of shared discovery and collaborative and creative problem solving, digitalization and innovation (Pavlik, 2015).

Despite the fact that ICT have become the everyday occurrence (Dobrica, 2019), by integrating distance learning elements in the study process of HEIs, using the decentralization advantages offered by ICT, it is possible to ensure the acquisition of interesting, interactive and qualitative study content in virtual environment and to find new possibilities for diversification and new forms of organization of the study process (Zogla, Prudnikova, Mykhailenko, 2019).

The effective **use of ICT** has been analyzed within the project Life with COVID-19: Evaluation of overcoming the coronavirus crisis in Latvia and recommendations for societal resilience in the future" CoviDzīve / CoLife Nr. VPP-COVID-2020/1-0013 in Latvia from June 2020 to March 2021 in the context of academic staff (lzp.gov.lv, 2020). The purposes of ICT use are shown in Figure 1.2.

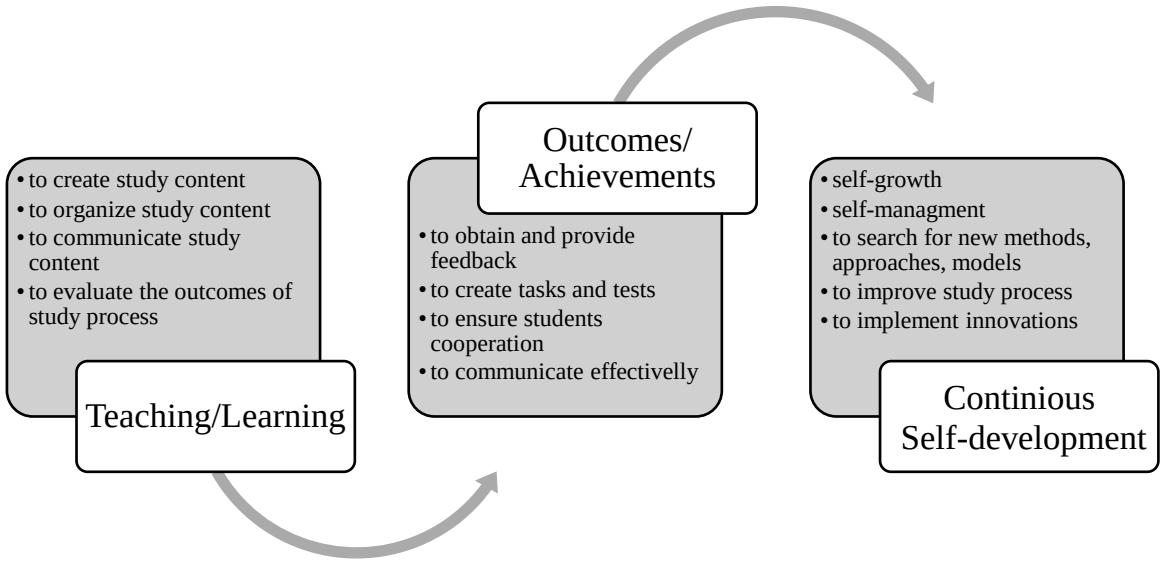


Figure 1.2 **Use of ICT in the Perspective of Academic Staff in the TDL context**
(adopted from (lzp.gov.lv, 2020) researcher's concept)

The core feature for the effective use of ICT is reflected in the continuous self-professional development of AS, while this process should be well-structured in order to achieve the necessary outcomes. The detailed study was conducted by Todd J.B. Blayone and Roland van Oostveen (Blayone, van Oostveen, 2020) how to work effectively in Industry 4.0 (Osburg, 2015)

related to the updated ICT perspectives, following DT (Iovan, Marge, 2019) , where the emphasize is on the detailed review at the beginning stage and systematic monitoring of progress, where the readiness scale is developed (Blayone, van Oostveen, 2020). Thus, the need of corresponding criteria and indicators for any assessment was approved. While in the context of HE, the idea of effective use of ICT is reflected in the concept of Smart pedagogy (see sub-chapter 1.3.). As smart pedagogy is a transformative force for preparing AS for work in Industry 4.0 as well as facing the TDL context within the current PhD research. Moreover, the continuous self and professional development becomes an integral part of our life and is directly reflected in LLL concern.

Lifelong learning is the life wide, voluntary and self-motivated pursuit of knowledge for not only personal but professional reasons as well (OECD IMHE, 2012). It does not only enhance social inclusion, active citizenship and individual development, but also increases competitiveness and employability (Ates, Alsal, 2012). Lifelong education is educational process throughout life of a person, which is based on changeable needs to acquire knowledge, skills, competence, experience in order to improve or change one's qualification according to the requirements of the labor market, one's interests and needs. Lifelong education unites informal and formal education, develops natural skills concurrently with new competence, ensuring the continuous development as personally as professionally (Fernāte, Birziņa, Kurlovičs, 2014).

Moreover, lifelong learning is an essential challenge for inventing the future of the societies; it is a necessity rather than a possibility as it is more than adult education and/or training — it is a mindset and a habit for people to acquire. Lifelong learning creates the challenge to understand, explore, and support new essential dimensions of learning such as: (1) self-directed learning, (2) learning on demand, (3) collaborative learning, and (4) organizational learning (Kommers, Fischer, 1999). The emphasis on the core components of the lifelong learning is reflected in Table 1.3.

Table 1.3

Emphasis of Lifelong Learning

(adopted from (Kommers, Fischer, 1999) researcher's created)

Component	Emphasis
Teaching	Change what we teach and how we teach
Learning	Learning with understanding
Epistemologies of knowledge	Understand existing knowledge and create new knowledge
New knowledge	Need-to-know, on demand, contextualized
Setting	Integrated, informal, hybrid, through communication/collaboration
ICT	Qualitative, effective learning with the help of ICT
Roles	Active user/designer, co-developer
Assessment	Articulating knowledge, reflective practitioner
Feedback	Self-assessment, further development planning

So, lifelong learning needs to promote effective educational opportunities in different learning/teaching settings through which individuals pass, including different ways of communication, collaboration, work and active participation either face-to-face or online (Fernāte, Birziņa, Kurlovičs, 2014).

As structures and policies provide alignment and support the change of any process, including future perspectives of HE, so they should be reflected in the strategic documents of the country. Are all countries ready to follow this path? The same countries as specified as good practices examples have been analyzed, concerning the reflection of highlighted three future perspectives (paradigm shift, effective use of ICT, LLL) in their strategic documents (see Appendix 1).

The ambitious future perspectives are presented in international and European dimensions: for example, in Canada to promote global ties and boost innovation capacity is highly recommended (Government of Canada, 2019). While in Ireland, innovation and skills, supporting a knowledge-based, innovative, creative society are specified, considering overall, research and innovation, adding creativity in significance as a key differentiator of the fields (Government of Ireland, 2020), the continuous development and the integration of research to teaching and learning is highly recommended (Department of Education and Skills, 2011). While, for UK, a world-class education with a global reputation, providing the excellence in teaching and learning is specified (Education and Skills Committee UK, 2003), offering the world-leading powerhouses of innovation and research and equipping students and AS with the

updated and required competence, skills and knowledge, and a grounding in the experience they will need to succeed in life and academic career (Department for Education UK, 2021; Department for Education UK, 2022). While, in Denmark, the focus is on long-term solutions through reforms, education, innovations, development and growth, considering educational development and digital transformation (Ministry of Finance, 2022), ensuring new knowledge and innovation, and strengthening the total competitiveness (The Regional Council, 2016). While, LLL idea has been effectively developed in Denmark since 2008, providing the effective and flexible process, by improving the competences and skills (Undervisnings Ministeriet, 2008). In Lithuania, there is a need to provide Smart society (LITHUANIA2030, n.d.) and implement innovations (Savickas, 2020). In Estonia, there is a priority to improve the quality of HE (Estee2035, 2022) and implement student-centred learning and teaching, a diverse learning environment, supporting learning throughout life, using a research-based approach and the potential of digital solutions (Ministry of Education and Research, 2020).

While, in Latvia, the digitalization of processes (Saeima of the Republic of Latvia, 2020), sharing of knowledge is required (Rivza, Markus, Kruzmetra, 2021), to use the potential of ICT to innovate education, including HE and training practices, improve access to LLL and to deal with the rise of new (digital) skills and competence needed for employment, personal development and social inclusion, reskilling the AS following DT (Carretero, Vuorikari, Punie, 2017).

Summing up, any improvement should be focused on a continuous basis, as with the progress and advent of modernization and globalization, it is imperative to implement the improvements in all areas of education, including HE (Kapur, 2019a). There is a potential for innovation, research, effective ICT use within DT to ensure quality of teaching and learning and scientific excellence in HEIs, and LLL for continuous self- and professional development of AS.

Without the clear understanding of further career development, overall excellence and quality assurance can't be achieved. Therefore, academic careers have to be an important aspect of HE policies and practice. High-quality academic work conducted by well-selected, supported, and incentivized academics is an important output of HE. In this aspect, within the WB project, in close co-operation with the Ministry of Education and Science Republic of Latvia, a new academic career framework was offered, considering the solutions to the fragmentation of teaching and research; lack of a predictable career path and weak internationalization (Ambasz

et al., 2022). So, the proposed classification of career stages for the Latvian perspective is presented in Table 1.4.

Table 1.4

Classification of Career Stages in the Proposed Latvian Academic Career Framework

(Ambasz et al., 2022)

Levels	Teaching-Oriented Position	Research-Oriented Position
R1	Junior Lecturer	Junior Researcher
	Assistant	PhD candidate
R2	Assistant Professor (non-tenure track/docent)	Postdoctoral Researcher
	Assistant Professor (tenure-track)	
R3	Senior Lecturer	Senior Researcher
	Associate Professor (tenure-track)	
R4	Professor	(Research) Professor
		Research Director

The offered classification is based on two different orientation of academic work: teaching-oriented position and research-oriented position, while it is recommended to combine both. Moreover, there are only four possible career stages instead of current five that are used at the moment (see Table 1.4). Additionally, the tenure-tracks are offered, that grant an AS permanent employment and job security. This system is widely used in America and Canada as the concept is closely tied to academic freedom, within the last ten years it has been successfully implemented in Europe (Pietilä, 2015) , for example Aalto University in Finland, Tallinn University of Technology in Estonia, etc. While the detailed framework for the assessment of AS performance should be developed for implementing the tenure track options or academic career promotion.

Unfortunately, there are no clear indicators for the evaluation of the study process of HE, considering the quality of teaching and learning, in the official documents of Latvia, neither in the three-pillar funding model of AS, covering base funding for studies and basic research; performance-based funding for study outcomes and research results; innovation funding - development-oriented financing to promote the specialization of institutions and their profile development (Ministry of Education and Science of the Republic of Latvia, 2015); nor in the progress forecast for scientific excellence, where the offered measurement cover only the statistics of the number of research staff, number of staff with a doctoral qualification; funding

for research and development, number of annual publications, business funding for R&D activities (Saeima of the Republic of Latvia, 2020). Moreover, only quantitative indicators are specified within the concept of AS in the Latvian perspective (see Figure 1.3).

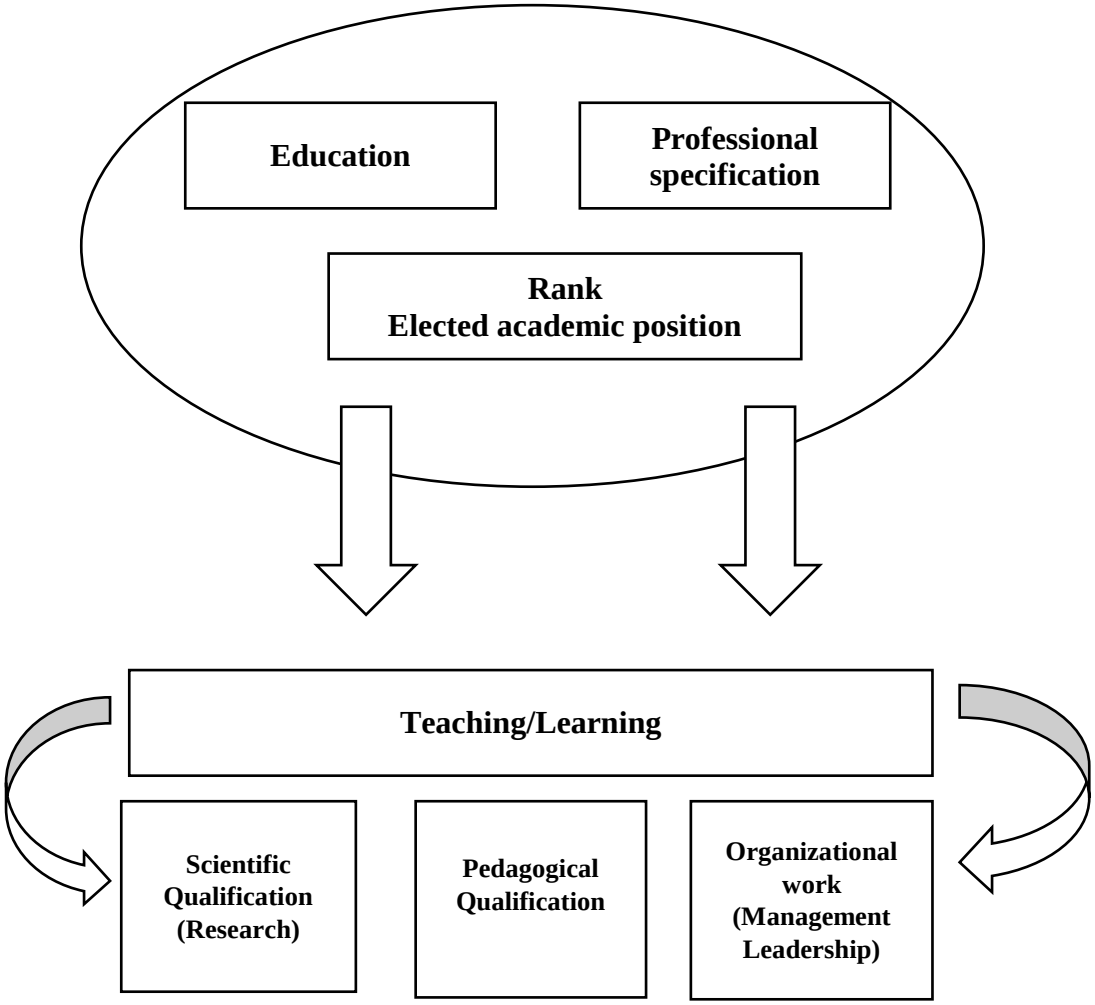


Figure 1.3 **Concept of Academic Staff of Higher Education Institution in Latvian Perspective** (researcher's concept)

Considering the fact that AS takes an elective position, so there is a need for the regulations for evaluating their performance. According to the regulations of Cabinet of Ministers of Republic of Latvia Nr. 129 for evaluating the scientific and teaching qualifications of an applicant for the position of professor or associate professor covering the key requirements in three dimensions: scientific qualification, pedagogical qualification and organizational work (Cabinet of Ministers Republic of Latvia, 2021) (Appendix 2). The concept of AS in HEIs in the Latvian perspective was developed basing on the analyzed definitions of AS, covering key competence, main activities and functions, possible career path and the future perspectives,

while the basis is formed from the evaluation procedure specified in the mentioned regulations Nr.129. So, AS should be equipped with the certain education and professional classification and experience for electing to the chosen position. While according to Latvian legislation three main elements are evaluated: scientific qualification (research), pedagogical qualification (teaching/learning competence) and organizational work (management, leadership). Still the support and control are required for achieving the required indicators (Kommers, Fischer, 1999). The described procedure is currently in use in Latvia while organizing the elections for the specified position of AS, while the regulations for the elections of other positions (assistant, lector, docent) are organized individually by HEIs, considering the state legislation.

In an effort to develop the academic career, by following continuous self and professional development the mastery achievement can be conducted in the specified field. So, despite the fact that PCAS hasn't been mentioned in either strategic documents, the regulations for evaluating associate professors or professors, in the context of current PhD research, when the emphasize is on non-teacher trained AS, there is a need to develop the didactical framework for the assessment of PCAS, covering key criteria and indicators for the assessment of AS performance for mastery achievement (see Figure 1.4).

The structure of Tallinn University of technology has been adopted for mapping the stages of mastery achievement through lifelong learning of AS in HEIs in Latvian perspective, this framework is addressed to the non-teacher trained AS for their professional mastering achievement. The offered framework for mastery achievement for non-teacher trained AS has been adopted to Latvian career path with five steps of career mapping. Coping with the professional mastery achievement in teaching and learning becomes largely a matter of improving PCAS.

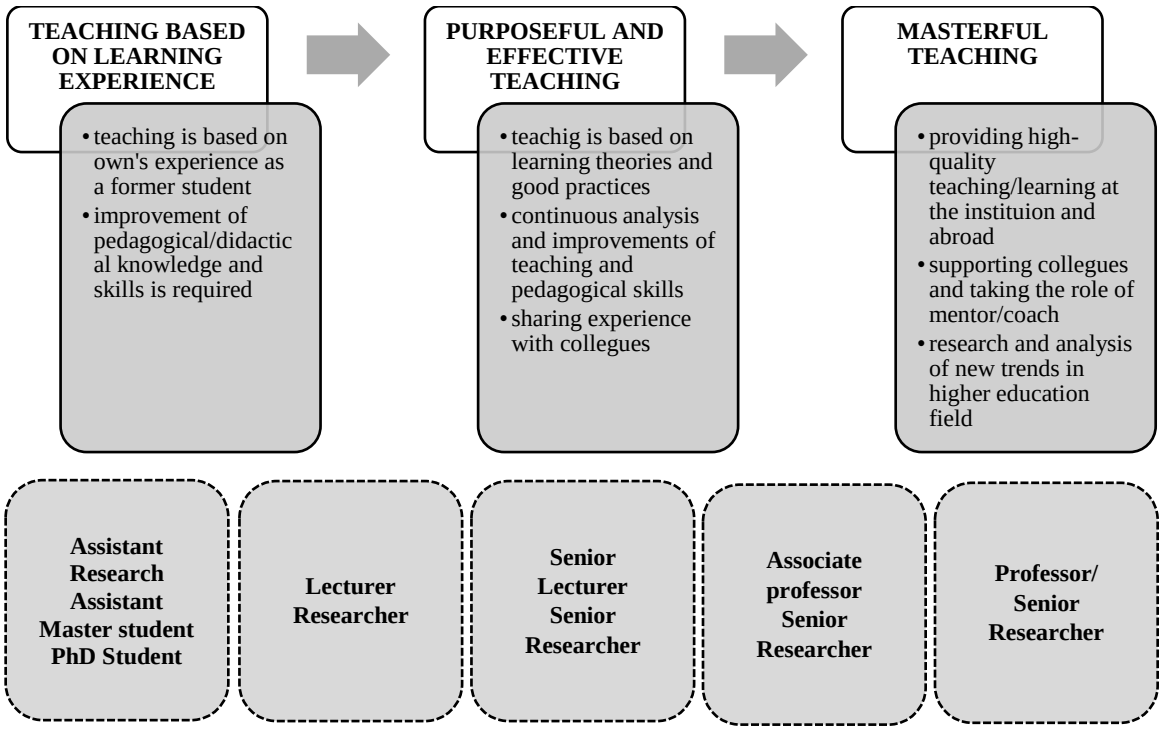


Figure 1.4 **The Stages of Mastery Achievement for Non-Teacher Trained Academic Staff in Latvian Perspective**

(adopted from (Ruutmann et al., 2022) created by researcher)

As higher education and science are labor-intensive in that the quality of its outputs, outcomes, and impact are strongly correlated with the quality and competences of its workforce, so it is important to clarify the PCAS for ensuring the further development and scientific excellence (Ruutmann et al., 2022). Despite the fact, that the concept of PC tends to be used with the meaning of minimum professional standard, often specified by state legislation, which should raise a person in fulfilment of particular level or role specified for AS. So, the concept of PCAS is the subject of the next sub-chapter, first, specifying the PC in general, and afterwards focusing on the non-teacher trained AS, that means the mastery achievement for the professionals of the specified field without pedagogical background: from teaching based on learning experience through purposeful and effective teaching to masterful teaching. This strategy will be revolved for further PC mapping.

Primary Conclusions

By forming the concept of AS of HEIs the four core aspects have been generalized: firstly, the definitions of AS, covering the key functions and activities; secondly, the ranking systems and career path for AS; thirdly, the further perspectives for the development of HE in terms of

AS and academic career planning; finally, the reflection of gained concerns about the Latvian perspective.

The three-dimensional approach was used for the cross-analyses carried out in international, European and Latvian dimensions. When forming the definition of AS, the general perspectives were observed, considering two main aspects teaching/learning and research (Cadez, Dimovski, Groff, 2017; Vaidya et al., 2022) that are common, while additional aspects can be directly related to the key activities and functions of AS recommended by the state or by HEIs. By drawing parallels with the ranking system world-wide, the comparative analyses of the following countries: Canada (CA), Denmark (DK), the United Kingdom (UK), Ireland (IE), Lithuania (LT), Estonia (EE), and Latvia (LV) were conducted, despite the unique versions offered, each country still has its own ranking system. Nowadays, academic career in HE in Latvia is organized according to a 5-levels/ranking system similar to the system, offered by the European University Institute (EUI , 2022). However, in accordance to the WB study in Latvia (Ambasz et al., 2022) there is a proposal for a 4-levels/ranking transition as it is directly linked to the mastery achievements.

Moreover, two types of AS have been specified: teacher-trained AS, with pedagogical background and non-teacher trained AS, professionals in the specified field, but with no pedagogical background (Voss, Gruber, 2006; Graham, 2015). So, the further research on the PC should be specified in two directions: for teacher-trained AS and non-teacher trained AS, while the context of the current PhD thesis is on non-teacher trained AS.

Summarizing the future perspectives of HE, it can be stated that a student learning-centred paradigm (Jacobs, Farrell, 2001; Blūma, 2016; Schieber, 2018), effective use of ICT to promote DT ((Elliott, 2017; Alcatel-Lucent, 2018; Dobrica, 2019; Zogla, Prudnikova, Mykhailenko, 2019) and continuous self and professional development as LLL aspect (Ates, Alsal, 2012; Fernāte, Birziņa, Kurlovičs, 2014) are the primary tenets for achieving excellence in teaching, learning, science and research and to be ready to work in Industry 4.0 (Blayone, van Oostveen, 2020) and considering smart pedagogy as a transformative force, specified in the strategic documents in three specified dimensions, and form the background for mastery achievement. Despite the fact, that future perspectives of HE in international and European dimensions are more ambitious, still the core features are the same, only the scope is different and should be considered. Moreover, the core activities of AS should combine teaching/learning and research, they have to be specified in the assessment procedure, while in Latvia currently assessment of

AS is based on the Regulations of Cabinet of Ministers Nr.129, and it covers three areas: scientific qualification (research), pedagogical qualification and organizational work (management, leadership), while the assessment of didactical aspect (the quality of teaching and learning) is not included. The didactic aspect of pedagogical competence of AS in HEIs will be analysed in the next sub-chapter.

1.2. The Essence and Structure of Pedagogical Competence of Academic Staff

The idea of improvement of the performance of AS is not new. It has started with the Bologna Process in 1998 and marked the necessity to harmonize the architecture of the European HE system with education and training throughout life and finding own teaching/learning area of excellence (Allegre et al., 1998). In the past decades, this idea of improving learning and teaching as the most fundamental objective, has been enlarged for calling for an inclusive and innovative approach to learning and teaching; for integrated transnational cooperation in HE, research and innovation and for securing a sustainable future through HE, where the key role belongs to the AS of HEIs (European Commission/EACEA/Eurydice, 2018).

To determine the essence of PCAS the following stages of the analyses have been set: firstly, to clarify how the pedagogical process is organized in HEI; secondly, to define the term competence in the context of education; thirdly, to provide clear indication of terms competence and qualification of AS and their compatibility; finally, to consider the essence and to design the structure of PC and its formation principles, focusing mainly on non-teacher trained AS. The idea of non-teacher trained AS has been already specified in subchapter 1.1. and defined as primary concern of the current PhD thesis.

As it is important at the outset to define clearly the boundaries of the research. By reflecting the pedagogical process of HEI, the traditional triangle of learner/student, teacher/educator and subject matter/content has been enlarged by the influence of external and internal study environment (Žogla, 2018). The important role of study environment is pointed out by R. Andersone as it promotes different ways of learning, covering feedback and reflection as well as help to continue LLL and knowledge-wide education (Andersone, 2017), the study environment should be informal with the possibility to study on their own and flexible, depending on the needs, supporting the learning process (Valtonen et al., 2021), adding the interdependence between the key components of pedagogical process, presenting the

development of pedagogical science, the direction of which has been changed from external influences on the learning process to the understanding of the complex nature of learning (Žogla, 2017). Thereby, the study environment as internal as external has a fundamental influence on the pedagogical process and has to be taken into consideration for the formation process of PC.

ICT as a driven force, especially after Covid-19 pandemics, provided the digital transformation in HE as well, so the role of Smart pedagogy is emphasized within the current research, while not yet precisely defined, but being a as a driven force in technology-enhanced teaching and learning (Daniela, 2018) and a transformative force for innovations and reflective practice (Meng, Jia, Zhang, 2020), being an integral part of the study process in the TDL context in HEIs with the beneficial use of technological solutions. While the effective interaction of all elements is required, where the interconnections are formed taking into consideration the specified goals and tasks. The point of interaction is reciprocal relationship between the specified elements, while educational interaction can be successful only if there is an awareness of the specified goals and tasks by all involved parties (Subakir, 2017).

By analyzing international authors (Petrenko, 2015; Subakir, 2017; Schieber, 2018; Kaplan, 2021; Valtonen et al., 2021) and Latvian ones (Fernāte, Birziņa, Kurlovičs, 2014; Andersone, 2017, Žogla, 2018) the researcher has established the following components for the indicated interrelations in the context of non-teacher trained AS: in student-educator context the process personalization and feedbacks are important; while in student-subject context the necessity to be relevant to the needs of students (student learning-centered approach) (Schieber, 2018), their learning ability, self-organization, selection procedure of tools and instruments as well as assistance of educator are required (Fernāte, Birziņa, Kurlovičs, 2014); in educator-content context the transformation of specified field content into study content is of key priority together with corresponding organization of study process, development of a course program, selection procedure of methods and approaches and progress assessment are specified (Kaplan, 2021). By developing systematic interaction between educator and student aimed at achieving the set of goals and learning outcomes, providing the improvement and development of their competences and skills as well as self- and professional development (Petrenko, 2015).

The quality of teaching/learning is the primary consideration of pedagogical process, so the PC of the educator, in the context of current research the AS, has to be specified. The concept of pedagogical process has been defined, while the concept of competence is not clear.

Concept of Competence

There is a broad understanding of competence with different definitions and interpretations that have been changed over time, while the concept of competence in general educational context has been analyzed through the doctrines of the following authors (Maslo, Tiļļa, 2005; Chong, Cheah, 2010; Ravotto, 2011; Baartman, de Bruijn, 2011; Chilingaryan, 2014; Illeris, 2013; Vitello, Greatorex, Shaw, 2021). While according to OECD definition of key competences for education, it is specified that a competence is more than just knowledge and skills, as it involves the ability to meet complex demand and challenges, that requires attitudes and values formation (OECD, 2003).

While according to Ravotto, it is the proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations (teaching/learning) and in professional and personal development, or a demonstrated ability to apply knowledge, skills and attitudes to achieving observable results (Ravotto, 2011).

While Illeris has showed the detailed complexity of competence terms and proves the multidimensionality of the competence concept in general, offering the flower model with the common of knowledge, skills, and personal characteristics, while still showing the necessity to add additional groups for nowadays changing environment and unknown situations (Illeris, 2013).

The concept of competence of the current research has been based on updated research report of Cambridge University Press & Assessment where the shared interpretation of competence has been specified to support teaching, learning and assessment. So, competence is the ability to integrate and apply contextually-appropriate knowledge, skills and psychosocial factors (e.g., beliefs, attitudes, values and motivations) to consistently perform successfully within a specified domain (Vitello, Greatorex, Shaw, 2021).

That means in time being the traditional understanding of competence formed by knowledge, skills and attitudes pointed out by international authors (Baartman, de Bruijn, 2011) and noted in the scientific papers of Latvian scientists (Maslo, Tiļļa, 2005) has enlarged its boundaries, where the specific meaning hasn’t been represented under attitudes, therefore the psychosocial factors have been specified, that include as attitudes as beliefs, values (Chong, Cheah, 2010) and motivation (Chilingaryan, 2014).

While in the context of AS the core feature of competence is a responsible meaningful usage of knowledge, skills and psychosocial factors in science of pedagogy, where a phase or cycle of action can be treated as a unit of research (Zogla, Prudnikova, Mykhailenko, 2019). Moreover, as it has been defined in subchapter 1.1. the AS is specified as employees with the listed professional qualifications where their experience in the field are evaluated in accordance to the national legislation and regulations. So, the updated concept of competence has been offered in the context of AS of HEIs (see Figure 1.5).

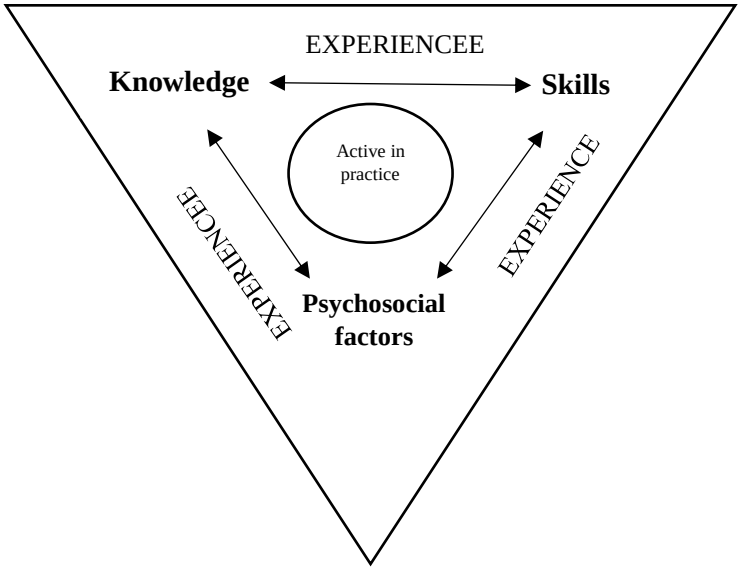


Figure 1.5 **Concept of Competence in the Context of AS** (created by researcher)

In the context of AS the concept of competence is formed by knowledge, skills and psychosocial factors, while the importance of experience is additionally specified, both previous and new one that is formed through active participation, experimenting, and new knowledge/meaning construction. The ability of individual to combine elements of these different competence dimensions result in competent behavior demonstrated in practice (Yams, 2017). While in dimension of competence-based teaching and learning, which roots lie in the work of psychologist McCelland in 1973, who offered to evaluate competence as life outcomes. It can recognize prior learning and learning outside the scope, regardless of where, when, or how that learning took place (Gigliotti, 2019). Meaningful feedback is emphasized, that empowers to take more responsibility for learning, reflecting challenges in HE, new models and ICT, paying special attention to pedagogical models and roles division (EDUCAUSE ELI, 2014).

Clearly defined groups of competence and measurable learning objectives that demonstrate mastery of the indicated group of competence should be offered to provide quick and frequent feedback should be an integral part of teaching/learning experience. The progress can be easily evaluated as instruction and facilitation is provided. As competence should demonstrate not only your knowledge, but also the ability to apply this knowledge effectively (Ravotto, 2011).

Despite the broad understanding of concept of competence, the primary tenets are still common. As already indicated the psychosocial factors differ among different concepts, while knowledge and skills are overriding. While in the context of AS the two main points are added – the experience and reflective practice, where the effective use of ICT is considered.

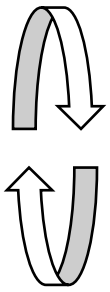
Cyclicity Nature of Competence Development

Next, there is a need to analyze the competence development process. There is a unified opinion on the formation process of any competence, including pedagogical competence, it is cyclical in nature (Fakhrutdinova et al., 2020). The idea is not new, as in 1984 Kolb reflected the cycle nature in the theory of experimental learning. It is the process of learning through experience, in narrow way defined as learning through reflection or doing, with active engagement of learners. Experimental learning is distinct from didactic learning and is specified as the source of development (Kolb, 1984).

So, the comparative analyses of three theorists: J. Dewey (Dewey, 1938), K. Lewin (Lewin, 1951), D. Kolb (Kolb, 1984) are offered (see Table 1.5) to specify the key features of formation cycle of competence.

Table 1.5

Overview of Experimental Learning Theories

Competence formation (cycle)	**Theory of J. Dewey**	**Theory of K. Lewin**	**Theory of D. Kolb**
	Knowledge and content organization	Concrete experience	Concrete experience
	Readiness and experience	Observations and reflections	Reflective observation
	Learning outcomes	Formation of abstract concepts and generalizations	Abstract conceptualization
	Social environment	Testing implications of concepts in new situations	Active experimentation

Dewey's experimental learning theory has been the background for Lewin's and Kolb's cycles. Conceptually identical cycles, utilizing a similar method, was proposed by the specified theorists. While Dewey's theory includes not only the individual perspective in experience formation, additionally requiring the social environment aspect, that significantly influence experience formation. In other words, the concept states that learning happens through doing, observing, thinking and trying again/experimenting (Bückinga, 2021).

As Lewin's experimental learning cycle has been based mainly on Kolb's theory, so both frameworks are closely affiliated and have common stages and features. That is learning from experience involves four stages which follow each other in a cycle, where the cycle can be entered at any stage, while the sequence has to be followed (Gibbs, 2013). So cyclical sequence of learning/teaching procedure is required, considering four stages: firstly, preparation and planning, where the needs are defined and steps formulated; secondly, implementations and monitor, where the progress check is conducted by providing the necessary support; thirdly, reflective practice and evaluation, where the competence development is checked and next cycle is planned; finally, the future perspectives are identified, considering the gained findings.

There is a need for continuous planning, monitoring, evaluation and identifying future development aspect for any competence formation, including PCAS. Two more features have been added to the competence development cycle of wwdevelopment.org: preparation and implementation (Sahana, 2018). By combining two doctrines the competence formation and development should follow the four stages cycle offered, while planning and preparation for teaching and learning is a primary tenet of the organization procedure of the study process in HEIs. It is cyclical in nature and happens continuously. After the implementation of the plan, the core idea is to examine its effectiveness by seeking out strategies, reasonable and acceptable adaptations for the future (Murtagh, 2012).

Competence vs. Qualification

In subchapter 1.1. the regulations of Cabinet of Minister Nr. 129 has been analyzed that are applied for the assessment of the performance of AS, addressed to professors and associate professor, covering three areas: scientific qualification (research), pedagogical qualification (digitalization, transformation, innovation) and organizational work (management, leadership) (LR MK, 2021). So, in order to establish clear understanding of terminology further used in the context of current research, the author offers an overview of two terms to eliminate the confusion

of the use: qualification and competence. According to the Latvian legislation the pedagogical qualification has been indicated, while for the further research PC has been used. The comparative analyses of qualification and competence categories are presented below (see Table 1.6).

Table 1.6

Comparative Analyses of Qualification and Competence Categories (Henschel, 2001)

Qualification	Competence
is aimed to meet specific external requirements	is applicable to the person
is linked to the required specific professional knowledge and skills	is related to the understanding of the integrity of the personality
is related to teaching and its organization from the outside	is related to the need for student learning and self-organization
is associated with elements of personal performance that can be certified	covers an unlimited number of operational dispositions

Qualification was moved to the center of HE policy debate, by establishing a European HE Area in 2010 and was defined as one of key aspects that are linked with recognition and quality assurance (EHEA Paris, 2018). To facilitate this discussion, the regulations of Cabinet of Ministers Nr.129 have to be reviewed in the context of pedagogical qualification (Appendix 3), where eight criteria for the assessment of pedagogical qualification are offered, covering the quantitative points, like number of supervised Master paper and PhD thesis, number of study programs, lecturers of foreign students, lecturers in foreign HEIs, etc. The specified criteria are a number of external requirements and is associated with the performance of AS that can be certified (LR MK, 2021). While the progress of personal and professional development of AS in the context of teaching/learning can be evaluated through the PC, not pedagogical qualification, next the concept of PC is specified.

Pedagogical Competence

As the starting point for defining the PC of AS a Swedish Perspective on PC Report was used. According to which the primary definition of PC has been offered. K. Apelgren and B. Giertz have specified that PC is the ability and the will to regularly apply the attitude, knowledge and skills that promote learning of students, in accordance to the goals that have been aimed at and the existing framework, additionally presupposing continuous development of the educator's own competence and course design (Apelgren, Giertz, 2010).

While A. Ryegard and T. Olsson have defined PC as the process, where the educator from definite goals and frameworks, through continuous development of teaching and personal development, supports and facilities the learning of the students in the best way, adding collaboration, comprehensive view and contribution to the development of pedagogy for HE (Ryegard, Apelgren, Olsson, 2010).

By drawing parallels, the following core elements are important for both concepts: the defined goals and frameworks, learning of students and continuous development.

While, there is a need to underscore the formation of direct linkage between learning process, the achieved progress and further development defining PCAS. But how the concept of PC has changed over the time (see Table 1.7).

Table 1.7

Comparison of Updated Pedagogical Competence Concepts (created by researcher)

Author	Core Elements of Pedagogical Competence
A.I. Suciu, L. Mata	psychological, interactional, organizational, managerial, administrative, social, economic, cultural aspects in close connection with: educational achievement/ success/ efficiency; professional development (Suciu, Mata, 2011).
I.Febrianis, P. Muljono, D. Susanto	the ability to organize the study material in understandable way, by using pedagogical knowledge and skills; it affects the success of educator in teaching, students' motivation and is directly linked with creativity and performance of educator and their satisfaction of work (Febrianis, Muljono, Susanto, 2014).
S. Aimah, M. Ifadah, D. Bharati	the ability to manage and run the process of teaching and learning; interaction, educators' performance, the ability of planning, the appropriateness in choosing the method and media of learning. It should be built through active practicing and collaboration with the colleagues, taking into consideration the progress of students' learning; professional development is important (Aimah, Ifadah, Bharati, 2017).
C.K.Sahana	performance, knowledge and skill in teaching and learning, including educators' capability to manage the teaching and learning process from the planning to the evaluation stages (Sahana, 2018).
N. Novianti, I. Nurlaela-wati	the ability to manage students' learning which includes understanding the learner; designing, and implementing, learning outcomes; and developing learners to actualize their potential; it is comprehensive, encompassing an educator's ability in various aspects of teaching and learning that has to be developed in line with the development of time, such as technological advances, scientific revolution, etc. (Novianti, Nurlaelawati, 2019).

Table 1.7 (continuation)

Author	Core Elements of Pedagogical Competence
A. Fakhrut-dinova et al.	a professional and personal characteristic of the educator, providing a high level of scientific and pedagogical activity; the possession of the necessary amount of knowledge and skills that determine the formation of the pedagogical activity, pedagogical communication and the personality of the educator as a carrier of certain values, ideals and pedagogical consciousness. A set of knowledge, experience, skills and possession of pedagogical technology, finding the optimal means of influence on the students, considering their needs and interests, rights and free choice of ways of activity and behavior, considering student-centered paradigm (Fakhrutdinova et al., 2020).
Y. Liu, L. Zhao, Y.-S. Su	educators should have certain types of knowledge, including pedagogical content knowledge, educators' content knowledge, and general pedagogical knowledge. With the application of digital technology in the education system, the usage of digital technology in the process of teaching has placed higher requirements on educators' competence, so their knowledge and skills should be expanded by utilizing technology effectively in teaching/learning, by adding technological pedagogical knowledge (Liu, Zhao, Su, 2022).

According to Table 1.7, the primary elements of PC have been specified: the core elements of learning of students are progress check/reflection, continuous development by enlarging within learning/teaching process, student learning- centred approach and efficient performance. While in the context of nowadays innovations the technological pedagogical knowledge has to be added, repeatedly emphasizing the in-line development, self and professional development.

Moreover, the smart aspect is offered for ensuring the smart AS, where the smart concept is formulated within several theories: firstly, smart technologies (Holnicki-Szulc, Motylewski, Kolakowski, 2008); secondly, SMART of (S) situated learning, (M) mastery learning, (A) adaptive leaning, (R) reflective learning and (T) thinking tools (Meng, Jia, Zhang, 2020), thirdly, smartness by adaptivity, sensing, inferring, anticipation, self-learning, and self-organization (Uskov et al., 2018); fourthly, smart of self-monitoring analyses and reporting technology (Karkazis et al., 2019); finally, smart is reflected to cleverness and wisdom, offering smart education, smart learning and smart didactics as a new theory of educational science, where the effective use of ICT is a primary tenet (Daniela, 2018). Thus, by offering the smart concept the smart AS is specified.

By summarizing the primary tenets, the author of PhD research offers such definition of PC. **Pedagogical competence of academic staff is a set of knowledge, skills and psychosocial factors, for enhancing the effective teaching/learning process in the higher education institutions, considering the study-environment, student-centred approach, lifelong learning and continuous self/professional development to meet the requirements of updated trends in the field of educational sciences such as innovations, digitalization and globalization.**

Structure of Pedagogical Competence

The listed core elements of PC were taken into consideration while forming the structure of PCAS. Several existing theoretical frameworks were analysed, those underpinning the above-described concept of PC. The background structure of PC is formed of the same elements, specified in the definition of PC, while putting them into groups and providing the cycle nature. There frameworks were analysed to work out the structure of PC (see Table 1.8).

Table 1.8

Comparison of Pedagogical Competence Frameworks (created by researcher)

Groups/ Aspects	Olsson, Mårtensson, Roxå 2010	Suciu, Mata 2011	Fakhrutdinova el al. 2020
I. Teaching/ Learning (pedagogical aspect)	Teaching Skills, Knowledge Pedagogical Practice	Educational efficiency (progress feedback)	Key group (general education content)
II. Research-Innovation (professional aspect)	Research-Innovation based knowledge	Professional development	General subject group (related to particular discipline)
III. Personal (individual aspect)	Perspectives	Individual development	Contributory subject group (follow-up, related to updated requirements, ICT)
IV. Social (incl. study environment)	Study Environment	Study Environment	

In general, the PC structure is formed of four core groups, where the basis is teaching/learning, covering pedagogical aspect, then on research-innovative, covering

professional aspect, related to particular discipline, additionally, specifying personal and social aspects, individual and professional development in the specified study environment.

Teaching aspect is a central component of PC, by demonstrating the ability to organize the study process in an effective way, by gaining the specified outcomes (Olsson, Mårtensson, Roxå, 2010), while professional, discipline related knowledge is also of crucial importance (Fakhrutdinova et al., 2020). PC is underpinned by knowledge about teaching and learning, by combining theory and practice and to develop a pedagogical understanding that create the precedent condition for continued self- and professional development, integrating a cyclicity nature into pedagogical practice the theoretical background of formation of PC is presented (see Figure 1.6).

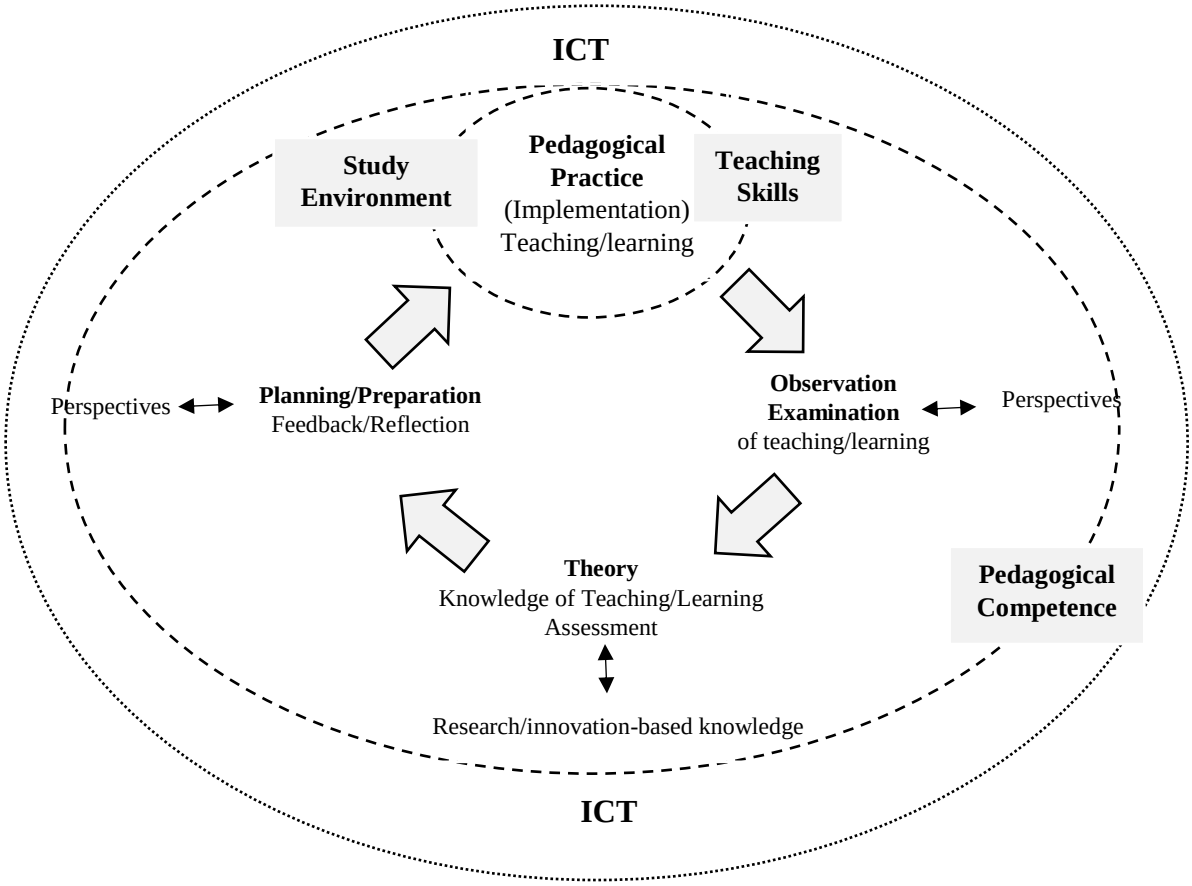


Figure 1.6 **Theoretical Background of Pedagogical Competence, considering Smart Pedagogy** (adopted from (Olsson, Mårtensson, Roxå, 2010) researcher's concept)

A schematic model shows the interrelation of theoretical knowledge and pedagogical practice, considering the study environment as the core aspect of efficient pedagogical practice. The PC formation goes spiral-shaped process, as after going through each cycle, the higher and more developed mastery level is achieved.

The focus of current PhD is on non-teacher trained AS, emphasizing discipline related aspect separately, still placing in front the pedagogical aspect – teaching/learning, paying special attention to the assessment (Sequeira, 2012), while the particular discipline aspect surely should cover research and innovations (Rajathi, Kumar, Tamilmani, 2017), reflecting the unification of teaching/learning, research, individual features and the study environment (Mâță, Cmeciu, Ghiaţău, 2013) and influence the effectiveness of the study process in HEI (Cadez, Dimovski, Groff, 2017), where the study environment is considered for higher-education level achievements (Andersone, 2017), moreover, the hybrid study environment is pointed out as one of the proposals triggered by covid-19 pandemics (lzp.gov.lv, 2020). In addition, the ability of individual to use a coordinated, synergistic combination of tangible and intangible resources for education efficiency under the societal changes and under the influence of the study environment, emphasizing the individual features (Suciu, Mata, 2011).

Following Smart pedagogy concept, the ICT impact is added (Daniela, 2018), as by analyzing theories, it is clearly seen that the idea of effective use of ICT has been actively emerging recently, especially after Covid-19 pandemics (Kaplan, 2021), facing rapidly changing demands an increasingly broader and more sophisticated competence is required from AS, where digital competence is directly linked with PC (Punie, Redecker (Eds.), 2017). Moreover, during Covid-19 pandemics AS was forced to rethink its ways of learning and teaching dynamically, transforming the understanding of PC in a technology-enhanced study environment, developing pedagogical digital competence (Jansone-Ratinika et al., 2021), approving the raised concept of smart student and smart AS.

For a deep understanding of PCAS formation and to enlarge the boundaries of the theoretical background offered, there is a need to determine the effective implementation of PCAS development through pedagogical theories and best practice examples.

Primary conclusions:

An important overriding concern for the organization of the effective pedagogical process in HEIs is an offset of external/internal study environments to promote different forms of

teaching and learning (Valtonen et al., 2021) that ensure the interrelationship of core elements of the traditional study process triangle and reflect the interdependence of learner/student - teacher/educator and subject matter/content (Žogla, 2017), while adding the emphasise of smart pedagogy concept (Daniela, 2018; Meng, Jia, Zhang, 2020), where the effective use of ICT is a primary tenet for ensuring the effective study process in HEIs, additionally the quality of teaching and learning is the primary consideration, so the PCAS is an essential element in ensuring it.

For a clear understanding of the essence of PC, the concept of competence is specified. The basic definition of competence in the educational context has been enlarged to reflect consideration of the updated UK report on knowledge, skills and psychosocial factors, that include attitudes (Maslo, Tiļļa, 2005; Baartman, de Bruijn, 2011), personal abilities (Ravotto, 2011), values (Chong, Cheak, 2010), believes and motivation (Chilingaryan, 2014). Moreover, the four-stage approach to the formation of each competence was offered, including PCAS, considering first the preparation and planning stage; second, effective implementation with support and monitor; third, examination and evaluation perspectives that blend theory with research and innovation-based knowledge; finally, identify the need for further development to ensure continuous development and lifelong learning, considering technological aspect. In addition, the cycle nature of the competence formation process is specified with the same cycle nature, considering the fundamental theories of experimental learning (J. Dewey, K. Lewin, D. Kolb).

Through the analyses of the PC concept of several authors (Giertz, 2003; Ryergard, Apelgren, Olsson, 2010) and the reflection of the concept change in the last ten years by the following authors (Suciu, Mata, 2011; Febrianis, Muljono, Susanto, 2014; Aimah, Ifadah, Bharati, 2017; Sahana, 2018; Novianti, Nurlaewati, 2019; Fakhrutdinova et al., 2020; Liu, Zhao, Su, 2022) the definition of PCAS has been offered as a set of knowledge, skills and psychosocial factors, for enhancing the effective teaching/learning process in the higher education institutions, considering the study-environment, student-centred approach, lifelong learning and continuous development to meet the requirements of updated trends in the field of educational science such as innovations, digitalization and globalization.

In the official documents evaluating AS, the concept of PC is not presented, only pedagogical qualification, therefore, by conducting the comparative analyses of two concepts, the main features and difference in meaning, reflecting the professional aspect in qualification

and personal competence, has been specified. As a result, it was concluded that the assessment of PC should be included in the Regulations of Cabinet of Ministers for the assessment of AS in HEIs for excellence in teaching and learning. Since PC is not an element of the pedagogical qualification, which reflects educational achievements and pedagogical action, performance and efficiency of the study process.

Finally, by analysing the theoretical background for the structure of PC (Olsson, Mårtensson, Roxå, 2010; Suciu, Mata, 2011; Mâţâ, Cmeciu, Ghiaţâ, 2013; Cadez, Dimovski, Groff, 2017; Fakhrutdinova et al., 2020) it was concluded that four groups need to be considered: teaching/learning group with general education content; research-innovative group related to the respective discipline; personal, based on individual characteristics; and social, including the study environment, while by enlarging the boundaries of today's challenges of HE, the smart pedagogy concept is addressed with the effective use of ICT. Since the focus of the current PhD thesis is non-teacher trained AS, it mainly relates to the first pedagogical group as teaching and learning and its interconnection to the others, thereby providing the multidisciplinary (Fakhrutdinova et al., 2020; Liu, Zhao, Su, 2022) and personalization (Fernāte, Birziņa, Kurlovičs, 2014; Schieber, 2018). In order to understand the essential aspects for the effective implementation of PCAS development through pedagogical theories and best practices the comparative analyses should be completed.

1.3. Implementation of Pedagogical Competence Development through Pedagogical Theories and Practices

1.3.1. Implementation of Pedagogical Competence Development through Pedagogical Theories

It is an eternal question of how teaching and learning process can be made more effective. There is no overarching pedagogical or educational theory that explains how we teach and learn in different situations. There are many theories about how teaching and learning processes are organized considering different aspects. While there is no clear consensus on the relationship between learning mechanisms and optimal teaching organization. While in the context of HE, HEIs occupy a unique position at the crossroads of teaching/learning, research, innovation, business, economy and society (European Commission, 2022), educational research can contribute to the development of innovative concepts in the field of education and can provide a broader understanding of the formation of the key skills and competence for achieving excellence in teaching and learning (UNESCO, 2021 b).

In order to understand learning and teaching mechanisms in HEIs, there is a need to study theories that reflect the formation of a new knowledge and skills of AS as well as the update of some current, paying particular attention to the previous experience of AS. As it has been specified in Chapter 1.1. the current research covers the non-teacher trained AS with no pedagogical background, while being professionals with certain experience in the field. So, there is a need to combine the best doctrines where teaching and learning process as well as competence development is constructed on previous personal and professional experience: *constructivism* (Sjøberg, 2010; Űltanir, 2012; Dennick, 2016; Dagar, Yadav, 2016; Taber, 2019; McLeod, 2019; Mukhalalati, Taylor, 2019, Akpan et al., 2020), *connectivism* (Siemens, 2005; Siemens, 2006; Marhan, 2006; Duke, Harper, Johnston, 2013; Herlo, 2017; Boyraz, Ocak, 2021), *activity theory* (Engestrom, 2000; Hashim, Jones, 2007; Blunden, 2015; Ploettner, Tressaras, 2016; Mikhalenko, Blayone, Žogla, Ļubkina, 2019), *smart pedagogy* (Daniela, 2018; Uskov et al., 2018, Karkazis et al., 2019; Meng, Jia, Zhang, 2020); *engineering pedagogy* (Sell, Ruutmann, 2015; Ruutmann et al., 2022).

Constructivism is a term that is commonly met not only in educational, but also in wider discourse (Taber, 2019), although it is used with a range of different meanings and associations relating variously to education philosophy (Űltanir, 2012), teaching and learning theory

(Dennick, 2016), approached to pedagogy (Mukhalalati, Taylor, 2019). While teaching and learning choices are influenced by a huge number of different factors such as social context, institutional context, cultural context, pedagogical background, etc. (Taber, 2019), research program and traditions (Mukhalalati, Taylor, 2019). Within the current research the constructivism theory is considered from teaching/learning perspective and competence development aspect (see Table 1.9).

By drawing the parallels of knowledge construction and competence development, the basic features cover an active and personalized process, based on the previous experience, reflecting an interaction with the study environment.

The idea of Piaget is still relevant, that knowledge is not static, its formation is continuous process of construction and reorganization in individual or solo context (Wardsworth, 1978), while Vygotsky added social process and social constructivism to the knowledge creation, considering collaboration as a core aspect (Bodner, 1986). One overriding concern that guides the constructivism theory (Piaget, Vygotsky, Dewey, Gardner) is two key tasks idea: an ability of a person to think constructively and to solve problems; in parallel way the continuous self-development, as our understanding is constructed within the whole life (McLeod, 2019).

Based on the existing understanding the sense of new situations is constructed (Dennick, 2016), considering the personalization of the process, based on enquiry, discovery, or any kind of active involvement from the learners (Sjøberg, 2010). So, previously existing knowledge is understood to be a map of what can be done in light of one's experience instead of an indication of what existed. Moreover, cognitive aspect is considered in a mixture of personal experience, emotions and intuition. Learning requirements are born of a complex life and the rate of technical and social change. Lifelong learning is indispensable and can't be resisted (Ültanır, 2012).

Table 1.9

Common Aspects of Knowledge Construction and Competence Development
(created by researcher)

	Knowledge Construction (Taber, 2006)	Competence Development (researcher's concept)
Process	actively constructed by the learner, not passively received from the outside; no imposition;	actively developed by the individual; no imposition;
Experience	existing ideas (some uncertain and unstable; some deeply rooted and well developed) about many phenomena is considered	based on the existing competence with experience in uncertain and unstable situations
Individual perspective	individual ideas about the world with many similarities and common patterns; some of these ideas are socially and culturally accepted and shared; the usage of function and tools to understand many phenomena;	individual competence, related to the perception of the world with many similarities and common patterns; the implementation of function and tools to check the effectiveness;
Scientific ideas	individual ideas are often at odds with accepted scientific ideas and some of them may be persistent and hard to change;	the development and improvement process rely on the accepted scientific ideas (response to changes);
Conceptual structures	knowledge is represented in the brain as conceptual structures and it is possible to model and describe these in some detail;	competence is developed, considering the cognitive aspect;
Student-centred approach	the learner's existing ideas have to be taken seriously; to change or challenge these; personalization of the process	personalization of competence development process
Interaction	knowledge in one sense is personal and individual, the learners construct their knowledge through their interaction with the physical world, collaboratively in social settings and in a different study environment	competence is developed through the interaction with the physical world, collaboratively in social settings and in a different study environment

Individuals construct new knowledge or develop the competence through the interaction between their previous skills and knowledge, the skills and knowledge gained from social interaction and social activities, based on the study environment, the physical and social world, focusing comprehensively on the internal cognitive mechanisms that underlie the learning processes, participation, and social interaction (Mukhalalati, Taylor, 2019).

Thus, according to constructivism theory, the main future perspectives of AS proposed in the sub-chapter 1.2.: lifelong learning, continuous development, student-centred approach, are commonly met covering a wider discourse with a range of different meanings and associations, while relating to academic staff of higher education, the importance and necessity of them is

obvious. As a result, the desired outcomes are achieved, showing the feedback and reflection of the process.

Thus, in the context of HE the existing significant goals of teaching and learning are transformed into teaching choices, considering the key contexts, core aspects of pedagogy of HE, new trends and paradigm shift for achieving primary outcomes. Additionally, the new knowledge gained from research should be integrated into the perspective on teaching and learning. As non-teacher trained AS that comes to teaching and learning with existing ideas about their specified discipline and these existing ideas have consequences for the study process and are supported by evidence-based approaches (Steglitz et al., 2015). So, the multidisciplinary is obvious and is widely demonstrated in teaching and learning in HEIs (Taber, 2019).

Therefore, the continuous self-development idea is quite relevant for the AS of HEIs either in teaching and learning, or the related discipline, in common with DT, which is still in progress. The DT as the core aspect of transformation digital learning is covered in the next sub-chapter 1.4.

The two types of constructivism have been considered in the context of current research: individual constructivism and social constructivism. As it is assumed that the new knowledge has to be constructed as individually as collectively through active interaction (Ültanır, 2012). Each learner has a tool kit of concepts and skills with which he or she must construct knowledge to solve problems presented by the study environment. The role of the community, other learners and AS is to provide the setting, pose the challenges, and offer the support that will encourage the learning process (Dennick, 2016).

The father of social constructivism, Vygotsky views the origin of knowledge construction as being the social intersection of people, interactions that involve sharing, comparing and debating among learners and mentors (Akpan et al., 2020).

The constructivist learning strategies can be developed using principles of social constructivism to improve academic achievement, high order thinking skills and social and emotional skills of the students. The effective study environment can be constructed by adopting the following: providing experience, considering multiple perspectives, providing social and emotional learning and using multiple modes of representation to view the topic being discussed from multiple dimensions) (Dagar, Yadav, 2016).

While constructivism, an epistemological view of knowledge acquisition emphasizes on four aspects: knowledge construction rather than knowledge transmission and the recording of

information conveyed by others; new learning builds on prior knowledge; learning is enhanced by social interaction and meaningful learning develops through authentic tasks. The role of the learner is conceived as one of building and transforming knowledge (Akpan et al., 2020).

Indeed, in many ways, constructivism theory idea of knowledge construction provides new label for competence development process, where the emphasis is on using and transforming the knowledge, by acquiring and using knowledge to solve problems, stimulating students thinking activities and enhancement, social interaction and assessment, where students themselves must be involved (Dagar, Yadav, 2016).

Summing up, the offered constructivism background, considering student learning-centered approach with individual perspectives, continuous development, based on the previous experience and lifelong learning with active interaction, considering DT, that is consistent with another pedagogical theory connectivism.

Moreover, as it has been already mentioned Covid-19 pandemic has triggered a worldwide shift towards online learning and teaching, therefore the transformation of the pedagogical process took place. This idea has been already investigated before the pandemic, as teaching/learning is considered to be a cyclic process, providing the inclusion of new innovations, modifying the content of teaching, changing teaching strategies, developing new teaching materials, planning updates of competences, etc. (Daniela, 2019), ICT bring people together and create new opportunities for teaching and learning at all levels of education, including HE (Žogla, 2021). In the last two decades ICT have offered new ways of communication, of learning, of teaching, of research and even of living. Therefore, there is a need to analyze one more learning model – connectivism.

Connectivism is a relatively new learning theory, that accepts the technology as a major part of the learning/teaching process and that the constant connectedness gives an opportunity to make choice about learning and teaching to make the process more effective. This learning theory is also named as a theory of digital age, covering the integration of principles explored by chaos, network, and complexity and self-organization (Siemens, 2005), where that decisions are based on rapidly altering foundations. New information is continually being acquired. The ability to draw distinctions between important and unimportant information is vital. The ability to recognize when new information alters the landscape based on decisions made yesterday is also critical (Boyraz, Ocak, 2021).

The following key aspects of learning and knowledge formation in the context of connectivism have been specified: 1) diversity of opinions; 2) connection of specialized nodes or information sources; 3) possible in non-human appliances; 4) capacity to know more is more critical than what is currently known; 5) nurturing and maintaining connections is needed; 6) ability to see connections between fields, ideas, and concepts is a core skill; 7) currency (accurate, up-to-date knowledge) is the intent of all activities; 8) importance of decision-making (Siemens, 2006).

Thus, choosing what to learn and the meaning of incoming information is seen through the lens of a shifting reality. While there is a right answer now, it may be wrong tomorrow due to alterations in the information climate affecting the decision (Duke, Harper, Johnston, 2013). To facilitate the discussion the conceptual framework for understanding the interplay of constructivism and connectivism is designed (see Table 1.10).

Table 1.10

Conceptual Framework of Constructivism and Connectivism (created by researcher)

Core Aspects	Constructivism	Connectivism
Definition	A theory which suggests that learning is an active process; new concepts are created, synthesized and applied, basing on current and past knowledge;	Learning theory which acknowledges the impact of technology, society, and personal networks;
Technology	Not emphasized	Emphasized
Interaction	Emphasized Individual-Society	Emphasized Human-IT
Previous experience	New knowledge is based on the previous one	No experience of everything Adaptive patterns
Continuous development	Socialization	Networking
Digital transformation	Not specified	The core element
Lifelong learning	Socialization	Networking
Student-centered approach	Meaning, created by each individual	Distributed within a network, technology-enhanced; recognizing patterns

As connectivism is a relatively new theory its practical significance is not clearly specified, while the role of technology is obvious (Herlo, 2017). Moreover, the interaction of human and IT is core element in connectivism (Marhan, 2006), while Individual-Society

interaction is the most important in constructivism (Taber, 2019). Covid-19 has triggered the transformation process, where the active Human-Computer interaction has been specified as the necessity of nowadays' reality of pedagogical process at all levels, including HEIs (Žogla, 2021). The idea of interaction is specified also in activity theory. As activity theory has been a visible landmark of the theoretical landscape of Human-Computer interaction (Mikhailenko, Blayone, Žogla, Ļubkina, 2019) the target research activity system is developed.

Activity theory is a conceptual framework originating from socio-cultural tradition of A. Leontiev, being widely used interdisciplinarily, in a range of many fields, including education, teaching and learning. The basic idea of activity theory is that human beings are not seen as separate from their everyday involvements in various kinds of activities. So, the main unit of analysis is the activity which people are involved in, no the human being. Moreover, this unit included society and the individual. Thus, activity system is a notion that refers to something that is collective. It brings in the collaborative relations between people and it is oriented at objects (Ploettner, Tresseras, 2016).

There are two key aspects differentiating activity from other types of interaction: firstly, subjects of activities have needs, which should be met through an interaction with the world; secondly, activities and their subjects mutually determine one another; activities are generative forces that transform both subjects and objects (Hashim, Jones, 2007).

According to Y. Engestrom the target research activity system is developed (see Figure 1.7), specifying six constituent elements: subject, an active agent capable of taking purposeful action towards a specify goal by using available tools, instruments and ICT, while object is the driving force of the activity, the problem space, following rules, organizational policies, the social nature and division of labor, responsibility and self-management of AS, the outcomes - the end of the result – in the perspective of current research – the development and improvement of PCAS is achieved. Each specified element is in close interaction with other elements of the model (Engestrom, 2000).

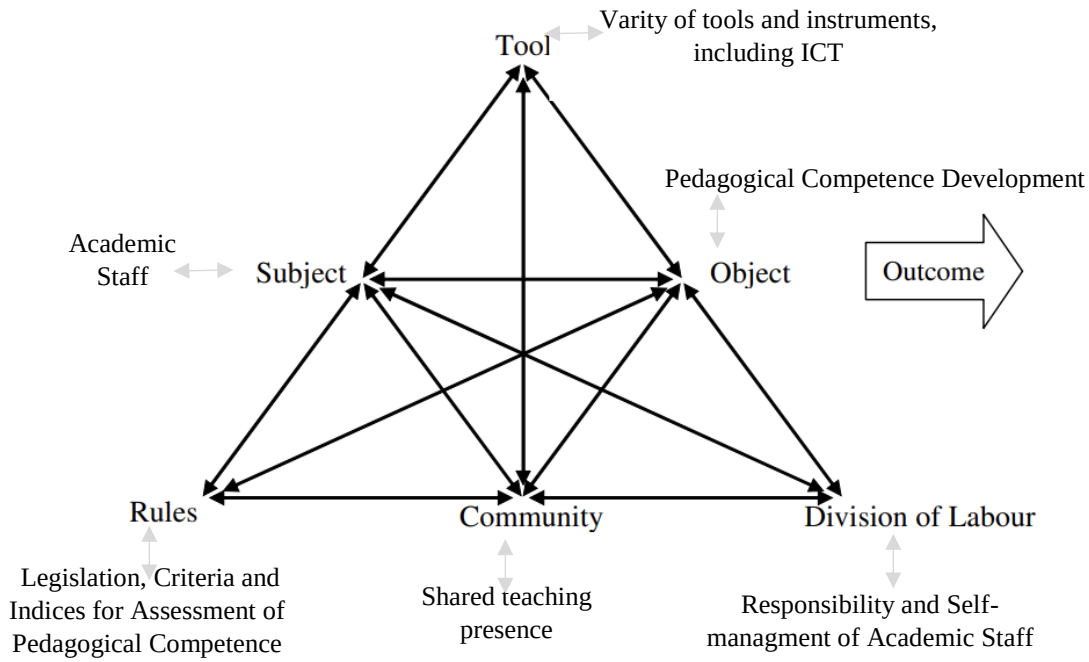


Figure 1.7 **Target Research Activity System** (researcher's concept)

As activity theory, by its nature, produce tensions, contradictions and innovations, which generate both resistance among the participants and possibilities for future transformations. So, first the contradictions are identified, and using the activity theory model the current and desired state of affairs are mapped. The next step is to gather motivation, resources and strategies for implementing the new model in practice (Blunden, 2015).

The basic idea is that human beings, within the current research is AS, that is connected with their everyday involvements in various kinds of activities. So, the unit of analysis is the activity which people are involved in, it includes as the society as the individual. Activity or activity system is a notion that refers to something that is collective. It brings in the collaborative relations between people and it is oriented at objects in close consideration of interdependent elements for the achievement of the desired outcome (Mikhailenko, Blayone, Žogla, Ļubkina, 2019).

The offered target research activity system model is a practical apparatus for organizing the process of development and improvement of PCAS in HEIs, considering the updated trends and challenges of the changing world, that are highlighted in chapter 1.4. towards DT, continuous development, LLL and student-centered approach for integrating them to the didactical model of the current research, paying special attention to Covid-19 impact.

Smart Pedagogy and Engineering Pedagogy as a Transformative Force

The science of pedagogy with its complex subject - education - is inextricably linked to social development processes. The roots of pedagogy are directly related to the cultural-historical development of mankind, while the scientific research on pedagogy today raises problems of education and establishes the new subject of pedagogy, defining it as education/self-education and the correspondence of teaching and learning in collaboration between student/learner and teacher/educator (Špona, 2022). In addition, in the last 25 years, the transformation of the educational system of Latvia took place by joining the European Union and following the reorientation in all areas, including education, which offered the discussion of the core concept of education and specified an alternative perspective, that of Educational Sciences (Žogla, 2017).

Moreover, new pedagogies and practical pedagogical research paradigms have emerged through the transformation of teaching and learning, considering the updated contexts and with special attention to DT and the effective use of ICT. Therefore, any research today should reflect the ongoing transformation process, while there is a need to specify what exactly is being transformed. The current PhD research is conducted within HE pedagogy as a sub-branch of Pedagogy. The goal of HE Pedagogy is therefore to identify, promote and ensure excellence and innovation in the theory and practice of teaching and learning in and across all disciplines in HE. Every educator develops their own way of teaching; therefore, pedagogy is also defined as the art of teaching, it is about imparting understanding and skills in methods that students can understand, consider and observe. Pedagogical principles focused on teaching learning arrangements and strategies, relationships with students, and acquiring knowledge of the study environment, known educational standards, and predicted skills and attitudes (Gudaji, 2019).

One of the tasks of the current PhD research is to develop the didactic framework for the assessment of PCAS, therefore the differences between pedagogy, didactics and educational sciences are specified. Since didactics is a discipline related to the science of teaching and instruction, as a part of pedagogy or educational sciences, when pedagogy focuses on the strategies and various techniques. While in English-speaking world, didactics covers teaching and learning and is based on the sum of theoretical knowledge and practical experience: teaching and learning in Ireland (teachingandlearning.ie, 2016); teaching and learning in the UK (Marston, Johns, 2021); teaching and learning in Australia (Australian Government Department of Education, n.d.) etc. This emphasize is common to the current research.

Moreover, when we speak about the essence of the didactic model, the concept offered by I. Žogla is used - the model is the unity of realization of theoretical and practical teaching/learning, determines the differences in teaching/learning process (Žogla, 2001). By generalizing the doctrines of new pedagogies while formatting the didactic framework, the transformation process of teaching and learning in HEIs should be considered, as this directly influence the nature essence of PCAS, as the didactic framework should be based on a certain paradigm, or should be as cross-paradigm model, providing the precise development process, including the content and core features of teaching and learning, considering the effectiveness aspect and the additional impacts (Žogla, 2001).

According to Chapter 1, the pedagogical process in HEIs includes key components, namely student, educator and study content, while the fundamental factor is the internal and external study environment (Žogla, 2021), considering the effective use of ICT as an integral part of nowadays pedagogy (Daniela, 2018). Thus, Smart pedagogy (Daniela, 2018; Uskov et al., 2018, Karkazis et al., 2019; Meng, Jia, Zhang, 2020) and Engineering pedagogy (Sell, Ruutmann, 2015; Ruutmann et al., 2022) are driven forces for the transformation of HE Pedagogy (see Figure 1.8).

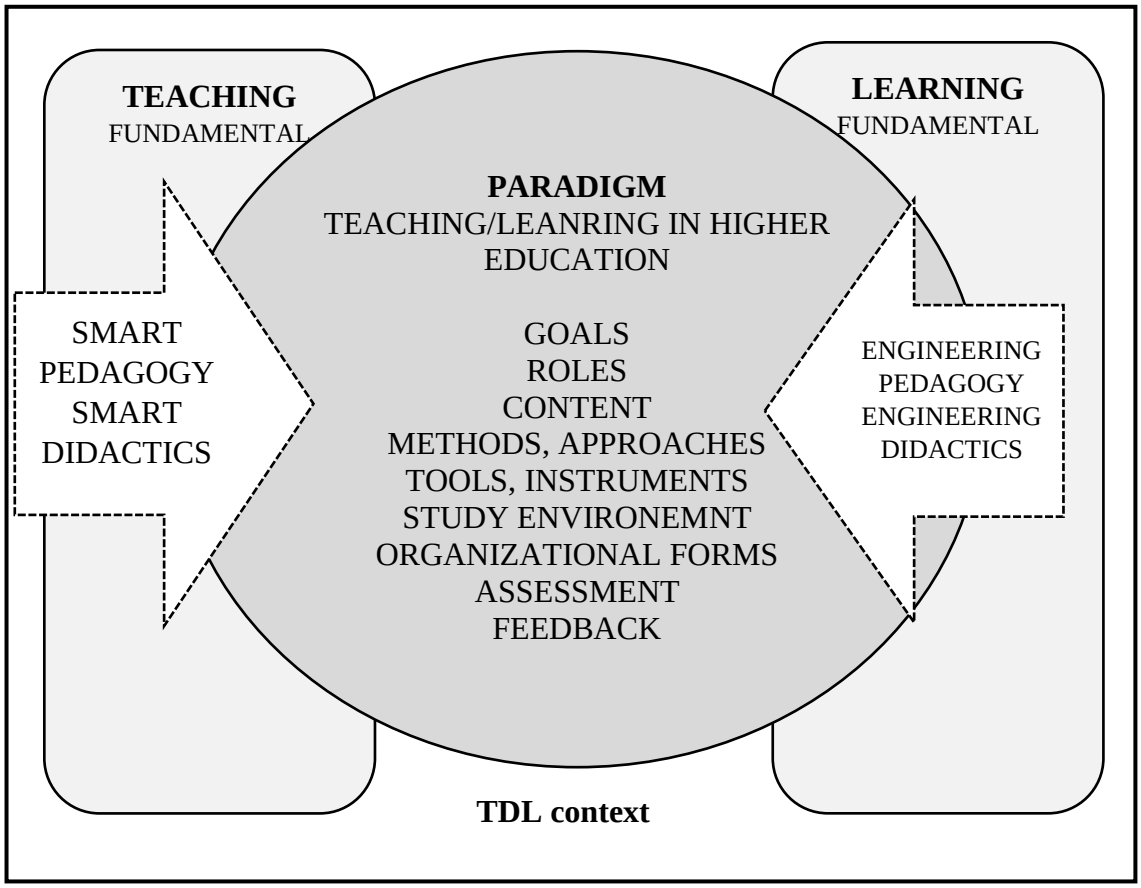


Figure 1.8 **Smart Pedagogy and Engineering Pedagogy as Driven Forces of HE Pedagogy** (researcher' s concept)

The main responsibility of AS formed by teaching/learning has changed, updating educational objectives, updating roles, reviewing and optimizing content, methods, approaches, expending learning materials and tools, revising traditional organizational and assessment forms, etc. (Uvarov et al., 2019), considering the nature of learning and teaching as significant components of the effective study process (Špona, 2022), offering innovative teaching/learning methods (Meng, Jia, Zhang, 2020), innovative teaching/learning strategies (Uskov et al., 2018), learning by doing and transferring knowledge to new situations (Sell, Ruutmann, 2015), developing personalized learning principles (Karkazis et al., 2019), and offering the concept of smart learner (Daniela, 2018).

According to Figure 8 the conceptual framework of the research is developed, covering the core components, where the teaching and learning of HE is transformed under the specified driven forces, considering the emphasize of the current research on non-teacher trained AS. The

conceptual framework formed the background for further presented didactic framework for the assessment and development of PCAS (see Chapter 2).

While the formation of PC and its development and implementation through good practices is presented further by drawing parallels with the analyzed pedagogical doctrines.

1.3.2. Implementation of Pedagogical Competence Development through Pedagogical Practices

The need for continuous development of AS is highlighted in strategic documents in international, European and Latvian dimension. In order to respond to the updated changes, AS need to be equipped with appropriate skills and competence (Hudson, 2017), by implementing rapid transition in HE (van der Ross, Olcker, Schaap, 2022), while a deep understanding of effective teaching and learning is required (Schleicher, 2018). In addition, knowledge should be generated, processed and applied to practical areas and problems. While HEIs should focus on professional development programs in teaching/learning for AS, to ensure the high level of mastery (Koc, Demirbilek, Ince, 2015). The productive tension between simultaneous individual and collective transformation determines pedagogical encounters. Both teaching and learning are nourished by and contribute to shared knowledge. While the traditional pedagogical triangle of student, educator and content needs to be envisioned within the wider understanding. Such pedagogies require continuous development for both students and AS (UNESCO, 2021 b). How this idea is reflected in three specified directions will be explained further.

Focusing on the concept of AS of HEIs in **Latvian perspective** (sub-chapter 1.1.) and considering the offered theoretical framework of PCAS (see Table 1.8) Latvian perspective of PC is offered (see Appendix 3), covering the four aspects: pedagogical qualification, scientific qualification, organizational competence and other competence, in accordance to Regulation Nr. 129 of Cabinet of Ministers Republic of Latvia (Appendix 2) the procedure for evaluating the scientific and teaching qualifications or results of artistic creation work of an applicant for the position of professor or associate professor is described. By drawing parallels, the pedagogical group is formed of pedagogical qualification, the professional group is formed of scientific qualification, personal and social groups are formed of organizational and other competence. The list of minimal requirements for the indicated criteria is presented in Annex 1 of the mentioned regulation (LR MK, 2021). While, they don't cover the essence of PCAS.

The comparative analyses of qualification and competence categories are presented in Chapter 1.2., Table 1.6, where the competence is related to the person, personality and self-organization, therefore the list of requirements complied to pedagogical qualification are considered as main categories of PC. As a result, the pedagogical qualification is considered from competence category and is directly related to the supervision activities, organization of study process (goals formation, content creation, methods and approaches, continuous development). Considering the Latvian perspective as a background the perspective of the Baltic States is offered as comparative matrix (see Table 1.11).

Table 1.11

Comparative Matrix of PCAS in the Perspective of the Baltic States

(created by researcher)

<table>
<tr><th>Group</th><th>LV</th><th>EE</th><th>LT</th></tr>
<tr><td>Teaching/ Learning</td><td>Pedagogical qualification</td><td>Teaching competence

Educational Technology Competence</td><td>Didactical competence</td></tr>
<tr><td>Research-Innovative</td><td>Scientific Qualification</td><td>Research Competence</td><td>Discipline-related competence</td></tr>
<tr><td>Personal (Individual)</td><td rowspan="2">Organizational and other competence</td><td rowspan="2">English language and other competence</td><td>Personal competence</td></tr>
<tr><td>Social (inc. study environment)</td><td>Not specified</td></tr>
</table>

In Estonia perspective members of AS are increasingly selected on the basis of their competences in two main fields: research and teaching/learning experience (European University Institute, Estonia, 2018), teaching/learning and research routes are combined (European Commission/EACEA/Eurydice, 2017), while the assessment of PCAS is analyzed on the good practice of Tallinn University of Technologies, which by relying on academic competencies and professional management, responds actively to the needs of the rapidly developing society and is involved in tackling the challenges of the digital era (Tallinn University of Technologies, n.d.), so Estonian perspective of PCAS covers five fields: research

competence, teaching competence, educational technology competence, English language proficiency and other competence (see Appendix 4). The research competence is directly linked with the teaching competence, as research-based knowledge should be actively used during teaching/learning process. The offered framework has been developed within the academic career management system for ensuring the quality and continuous development of teaching/learning and research, considering the academic evaluation matrix as the main document for the accreditation and development evaluation and planning (Senate of Tallinn University of Technology, 2021).

While the Lithuanian system of HE has undergone profound changes since the early 1990s and the beginning of its democratization process. The situation is very fluid and rapidly changing (European University Institute, Lithuania, 2018), concerning teaching/learning and research, these activities are also combined for the AS of Lithuania (European Commission/EACEA/Eurydice, 2017). According to Appendix 5 Lithuanian perspective of PCAS covers three key fields: personal competence, discipline-related competence and didactical competence. Each HEI works out the official document – set of regulations for the teaching/research AS recruiting competition, where the list of criteria is specified, covering PC. Vilnius University has been chosen as good practice example, specifying the following core fields of PCAS: the understanding of the goals of teaching/learning and the responsibility of the educator and the student in the study process; study and assessment methods, approaches; research-based teaching/learning; feedbacks; cooperation with students, colleagues, other stakeholders; self-assessment of PC, where the continuous improvement of skills for teaching and supervising students, supporting the achievement of outcomes and development of innovative educational content with the effective use of ICT are important (Senate of Vilnius University, 2021).

Thus, the understanding of PCAS is the perspective of the Baltic States is very similar and is related to pedagogical and professional group, while personal group is specified directly in LT perspective, while social one is not separately emphasized.

Next, to display **an international and European vision** of PC the good practices of the following countries were analyzed: Canada (CA), Denmark (DK), the United Kingdom (UK) and Ireland (IE) (see Table 1.12).

Table 1.12

Comparative Matrix of PCAS in the European and International Perspectives

(created by researcher)

	LV	CA	DK	UK	IE
Teaching/ Learning	Pedagogical qualification	Fundamentals of Learning Assessing Student Learning Engaging Students	Knowledge of T/L Reflection	Core Knowledge Area of Activity	Professional Knowledge and Skills in T/L
Research-Innovative	Scientific Qualification		Projects Programs Practice	Professional Values	Professional Development
Personal (Individual)	Organizational and other competence		Responsibility	Not specified	Personal Development
Social (inc. study environment)			Peer Supervision	Not specified	Personal and Professional Digital Capacity in T/L

The Canadian perspective of PC offers three dimensions approach, covering fundamentals of learning, engagement of students and the assessment procedure of the learning outcomes (see Appendix 6). The fundamentals of learning are formed of active learning, as a special approach with thoughtful engagement of students either with the course material and with one another, but not just watching, listening, and taking notes (Felder, Brent, 2009); critical thinking that encompasses the subject's ability to process and synthesize information in such a way that it enables them to apply it judiciously to tasks for informed decision-making and effective problem-solving (Heard et al., 2020); the ability to identify and solve problems; formulate,

evaluate and use information; test ideas based on relevant criteria; recognize one's own judgment and test them; to communicate effectively (Rios, 2015); high-impact practices to foster student success, covering academic achievement, engagement, satisfaction, and student persistence (Kuh, O'Donnell, Schneider, 2017); engagement of students is organized through the built communities, considering the first lesson concept and large class teaching; the assessment of student learning is obvious by active involvement of student in the assessment process, providing different types of assessment (westernU.ca, n.d.), reflecting five fundamental values: honesty, trust, fairness, respect, and responsibility (ICAI, 2021), while providing feedback and progress check for further activities planning (westernU.ca, n.d.).

In European dimension, Denmark's HE system is one of the best known in Northern Europe and it is renowned for its excellence and innovation, and combines traditional lecturers and tutorials with teaching that will help students develop strong problem-solving skills in friendly and relaxed study environment (Danish Agency for Higher Education and Science, 2022). There is no unique Danish perspective of PC, while a good practice example is mentioned by University of Copenhagen (see Appendix 7) with the basis formed of the academic qualifications and knowledge of the academic subject. The PC is described in six specified areas, where two are the core ones: knowledge of learning, teaching and study programs and the ability to establish and develop good teaching practices through continuous reflection on their own teaching/learning. In addition ((Kobayashi et al, 2017). The primary responsibility of educator to promote effective growth and development of students, facilitating the achievement of academic goals and up-grading the overall system of education, following the development strategy and priorities (Kapur, 2019b), emphasizing the self-activities and autonomous representative of their self for effective teaching/learning and responsible dialogue with others as students, as colleagues (Kostogriz, 2019).

There are several Excellence Frameworks as a method used for assessing the level of excellence in different specified aspects of British HEIs (European University Institute, the United Kingdom, 2018), while the UK Professional Standards Framework is used as a background for teaching/learning and supporting learning in HEIs (see Appendix 8). So, the UK perspective of PC covers three core dimensions: core knowledge, area of activities and professional values, the continuous professional development of AS engaged in teaching/learning is required, fostering dynamic approaches though creativity and innovation,

demonstrating the high level of professionalism, acknowledge the variety and quality of teaching, learning and assessment, facilitating activities for quality enhancement.

In Ireland, student-centered learning and teaching are core pillars of the specified mission, enabled by creative scholarship and innovative research which is applied to enhance the economic, social and cultural well-being of the nation. The universities are continuously engaged in ensuring that the learning and teaching which takes place is of the highest possible quality, up-to-date, relevant, and delivered to students in a variety of suitable ways (Trinity College Dublin, 2019), particularly in light of rapid advances in digital learning and a need to expand LLL (Irish Universities Association, n.d.), the specified discipline is important, by setting professional and social networks that emerge in those contexts (Clarke et al., 2015).

The Irish perspective (see Appendix 9) is based on the National Professional Development Framework with the aim for AS to create, discover and engage in meaningful personal and professional development, additionally to encourage them to engage in peer dialogue and support in their professional development activities; to enhance and develop the pedagogy of individual disciplines for relevance and authenticity and enable learning from other disciplines, ensuring multidisciplinary, implementing the evidence-based enhancement and transformation of their teaching and learning for quality assurance and enhancement of the student learning experience (teachingandlearning.ie, 2016); covering five domains that correspond to teaching and learning: personal development; professional identity, values and development; professional communication and dialogue; professional knowledge and skills; personal and professional digital capacity. The list of elements of each domain is presented in Appendix 10, considering the continuous professional development as a core priority, following cycle nature same as described in Chapter 1.2.

Summing up, a clear parallel can be drawn in the European perspective (see Table 1.12), while in Canada an absolutely different approach is offered, covering teaching/learning and assessment, while there are no components of other specified groups. Moreover, digital aspect is specified only in the IE perspective with no mentioning in other. As a result, the European perspective and the perspective of the Baltic States are used mapping the practical background for the implementation of PCAS in HEIs.

Primary conclusions

Summarizing the analyses of constructivism doctrines are (Sjøberg, 2010; Űltanir, 2012; Dagar, Yadav, 2016; Dennick, 2016; Taber, 2019; Mukhalalati, Taylor, 2019; McLeod, 2019,

Akpan et al., 2020) in the context of PCAS, one can conclude that the proponents of it emphasize the active personalized process of constructing new knowledge, skills and competence, based on previous experience, including study environment and collaboration. The overriding concern is that the construction is a continuous process that ensures self- and professional development. For the effective implementation in the HE context, the role of the community should be specified (Dennick, 2016), the interaction between the core elements of the pedagogical process in HEIs should be ensured (Akpan et al., 2020) and the effective study environment should be constructed (Dagar, Yadav, 2016).

With particular reference to the impact of Covid-19 on the study process in HEIs (van der Ross, Olcker, Schaap, 2022), where the core role of ICT is specified (Schleicher, 2020), the connectivism theory is used to explore the opportunity of making teaching and learning processes in HEIs more effective (Siemens, 2005), based on rapidly changing foundations (Boyraz, Ocak, 2021), considering the diversity of options and sources of information, huge capacity and non-human application (Siemens, 2006), ensuring multidisciplinary fields, ideas and concepts (Boyraz, Ocak, 2021), with the information climate influencing the decision-making process (Duke, Harper, Johnston, 2013). Where Smart pedagogy (Daniela, 2018; Uskov et al., 2018, Karkazis et al., 2019; Meng, Jia, Zhang, 2020) and Engineering pedagogy (Sell, Ruutmann, 2015; Ruutmann et al., 2022) are transformative forces and should be considered for the formation of PCAS, ensuring DT of HEIs.

By drawing parallels in the examined theories, the envisaged research activity system is developed, based on the model of Y. Engestrom (2000) and comprising seven core elements: AS as a subject, development of PC as object - desired outcome; tools, including ICT; rules, covering current legislation, key requirements, existing criteria and indicators; community - networking society with shared teaching presence; and division of labor, reflecting responsibility and self/professional development and management of AS. The activity system apparatus is an effective approach to the transformation process of teaching and learning in HEIs (Mikhailenko, Blayone, Žogla, Ļubkina, 2019).

So, the conceptual framework of the research was developed, covering the core components, where the teaching and learning of HE is transformed under the specified driven forces, considering the emphasize of the current research on non-teacher trained AS. The conceptual framework formed the background for further presented didactic framework for the assessment and development of PCAS.

Moreover, as a result of comparative analyses from the perspective of the Baltic States (LV, LT, EE) and from the combined perspectives of international (CA) and European (DK, UK, IE) perspective, considering the theoretical framework of PCAS, developed in sub-chapter 1.2. and Latvian perspective as background, it was approved that three specified groups of PCAS correspond to the Baltic States and best practices of European perspective, while in CA a different framework is used. Thus, by drawing the parallels the three groups of PCAS are highlighted for further investigation: pedagogical (teaching and learning); professional (research-innovative); personal (individual aspect); social (including the study environment.

Thus, the offered four-group background of PCAS has been confirmed by pedagogical theories and examples of good practices, while the digital aspect should be additionally emphasized, including the formation of an effective study environment, and is covered in the next sub-chapter that sets the TDL context for implementation of PCAS in HEIs.

1.4. Transformative Digital Learning Context in Implementation of Pedagogical Competence

The relevance of TDL as the context of the current PhD research is evident as the idea of DT is specified within the same three dimensions: international, European and Latvian. DT is reflected in a global initiative by UNESCO covering the need to reimagine teaching/learning to meet new challenges and trends (UNESCO, 2021 a); is is the core idea of Digital Europe Program (DigitalEurope, 2020) and Digital Education Action Plan 2021-2027 (European Union, 2020); the same idea is specified in the National Development Plan of Latvia, which highlights that DT is the key to productivity and economic growth and ICT catalyzes the change in economy, public administration and society and covers the educational aspect (Saeima of the Republic of Latvia, 2020); and in the Latvian Strategy for Sustainable Development Strategy up to 2030, where the effective use of ICT, transformation of the profession of teacher and LLL aspect are specified (Saeima of the Republic of Latvia, 2010). In addition, the DT is consistent with the same aspects, specified in the strategic documents of the seven analyzed countries (see Appendix 1).

It is for this reason and in order to answer the faced new challenges in HE the TDL context has been specified for the current research. The conceptual apparatus of this context is formed

of the following essential features: transformative learning theory, digital transformation, and digital learning. The unit of analyses selected to explore the TDL, offering its definition and the conditions for its effective implementation. Although the impact of Covid-19 pandemics is specified, presenting the updated trends for the HEIs in the perspective of AS.

Transformative Learning Theory

Transformative learning theory has started from J. Mezirow's Transformative Theory, related to the adults learning and within the current research fits well in AS perspective in HEIs. The core idea of the theory is transformative learning that occurs when an adult engages in activities that cause or allow them to see a different worldview from their own, through the uncertain situation or condition. Afterwards adults work to integrate the implications of that different worldview into their own worldview, thereby enlarging it. This process of changing to person's worldview and the enlarging of it is called transformative by J. Mezirow (Taylor, Cranton, 2013).

By drawing parallels of the original idea of Mezirow's theory with the updated version the comparative matrix is presented in Table 1.13, where the obvious differences are visually presented.

Table 1.13

Comparative Matrix of Practical Application of Transformative Learning Theory

(adopted from (Mezirow, 1997) researcher's concept)

		1st Stage	**2nd Stage**	**3rd Stage**	**4th Stage**	
1999		elaboration of the existing point of view	establishing new points of view	transforming the personal point of view	transforming ethnocentric habit of mind	
2003	a disorienting dilemma	-self-examination; - a critical assessment - recognition	- exploration of options - planning	- acquiring knowledge and skills - provisional trying	building competences and self-confidence	a reintegration into one's life dictating by one's new perspectives

Thus, in the context of current research the development of PCAS is a disorienting dilemma, where similar steps as specified in competence development cycle (see sub-chapter

1.2) have to be followed for gaining the result: identify, plan, support/monitor and evaluate. These elements are common to any competence development process, reflecting TDL context. The new perspectives can be formed after the self-examination/assessment, basing on which the new competence developing steps are set. It is evident, that a significant stimulus is needed to undergo any transformation (Mezirow, 2003), while during the elaboration of existing point of view there is a need of self-examination, a critical assessment and the recognition of the situation. Basing on the examination and assessment the exploration of options and planning follow, establishing new points of view (Taylor, Neter, Wayment, 1995). While the acquirement of knowledge and skills with provisional trying of new roles transform the personal point of view. As by building competences and self-confidence in new roles transform ethnocentric habit of mind, providing the new perspectives for further development and improvement (Vindaca, Lubkina, 2020); it is a type of deep learning that involves to create social relationships and focus on the changes that foster a culture of learning, support, reflection and meaningful communication and consideration (Henderson, 2002).

Digital Transformation (DT)

While DT spans all the processes and activities of any organization or institution in order to make the process effective and individual - centered. Moreover, the organizational transformation takes place in both specified contexts, by the adoption of ICT and realignment of main activities and process to move the organization or educational institution to the DT, emphasizing as a physical and philosophical change designed to meet the requirements and demands of all involved and create the fully connected operating environment (Tulchinskij, 2017), considering two main aspects: institutional strategy and student-centered service with parallel implementation and evaluation the success of the process from an institutional perspective though cyber security and operational efficiencies and from the students' perspective through ICT foundation and their own success (Alcatel-Lucent, 2018).

Thus, the effectiveness of the DT of any HEIs depends on their institutional strategy and its implementation. The DT idea is confirmed by analyzing the strategic documents of some HEIs of the specified countries in the same dimensions: international, European and Latvia (see Appendix 11). As the emphasis of the current research is on non-teacher trained AS, so the strategic documents of technical universities have been analyzed to verify the presence of ICT or DT aspect. So, according to the strategic document of the specified HEI the presence of DT aspect has been approved as an essential feature for the successful implementation of DT, where

the strategic documents serve as a framework for HEI for planning the key activities and processes.

It is not enough to emphasize the necessity of DT, the primary tenets of the study process of HEIs should be updated, considering paradigm shift in HE and renewed trends and challenges. According to the vertical structure of education paradigm offered by Blūma where the primary categories are specified (Blūma, 2016), while the traditional process should be reviewed, implementing the rapidly growing potential of ICT (Uvarov et al., 2019), so, the following aspects should be transformed: educational objectives should be changed or updated; content, methods and solutions should be reviewed and optimized, learning/teaching materials, tools, approaches, services should be expended a d traditional organizational forms of teaching/learning should be revised by offering new and innovative types, considering the updated roles of all parties involved and emphasizing the assessment aspect.

While the overriding concern, that guides the DT is the effective usage of ICT. As ICT serve as supportive tool, offer great opportunities for innovation, growth and employment, contributes to the global competitiveness of people and enhances creativity and cultural diversity. Moreover, the modern learning field is created of three key elements: pedagogy, the study environment and ICT (Visvizi, Lytras, Daniela , 2018), driving new levels of collaboration, innovation, digitalization and globalization (Alcatel-Lucent, 2018), offering new ways of respecting contexts, as ICT help with contextualization in learning to overcome the challenges of teaching abstract methods derived from concrete situations (Mahlow, Hediger, 2019), requiring personalized, result-oriented model of organizational of educational process, facing the requirements of high-tech enterprises (Elliott, 2017), as the usage of ICT does not result in effective DT (Dobrica, 2019).

The concept of effective implementation of DT in HEIs was discussed within RTU ERASMUS+ project Transformative Digital Pedagogies for Higher Education TDP4HE (Nr. 2022-1-LV01-KA220-HED-000085277) and EUt+ summer school in France, Troyes, September 2022, the following elements were offered for facing the necessary transformation: critical thinking as an integral part of any transformation, creativity and active collaboration, to support open access to learning, to use digital solutions in an appropriate manner, to improve digital competence, flexibility, promote autonomy of students, to build feedback and reflection in a timely manner for further improvement planning of DT process.

The effective implementation of DT in HEIs should follow the primary pedagogical tenets with ICT integration, so the concept of Smart pedagogy and Engineering pedagogy should be considered (see sub-chapter 1.3.) as a driven force for this process.

Transformative Digital Learning

Moreover, transformative digital learning is an appropriate response to the Covid- 19 impact, that is prepared and follows the lowest level of learning – interpretation process and develops further in transcendent learning, where the core element is common though, previous experience, knowledge or practical wisdom gained previously; or prepares an adequate background for further expert qualities (Žogla, 2021), the movement from rational discourse to meaning perspective requires the presence of ideal conditions covering some core elements that forms the TDL context, these are accurate and complete information, no coercion and self-deception, evidence-based approach, evaluation of arguments, critical reflection, openness to alternative perspectives, equal opportunity to participate and legitimate test of validity. In addition, to the above three types of consensus are specified: informing, objective and rational (Uvarov et al., 2019).

It can be concluded in **the definition of transformative digital learning – the process of individualized, lifelong spontaneous or planned technology - enhanced learning, changing and updating of educational results, content, methods and organizational form adopting them to the quickly evolving digital environment, including physical and philosophical change or transformation to meet growing demands of learners to achieve rich intellectual property by defining new perspectives and adopting personal worldview accordingly value-created learning** (Vindaca, Lubkina, 2020).

How it is reflected in real pedagogical practices has been verified through experts' interviews in December 2019 within the FLPP project "Implementation of Transformative Digital Learning in Doctoral Program of Pedagogical Science in Latvia (DocTDLL)" lzp-2018/2-0180. Ten experts from Latvian HEIs proved the necessity to follow transformative approach in comparison with the traditional one filling in the form (see Appendix 12) and showing the priorities (see Appendix 13).

While for effective implementation of TDL context in HEIs there is a need to deal with the following features that should be solved primary: personalization and individualization of study process, that is oriented towards formation of personality and experience, in which the

role of ICT is obvious, learning has to be transformed to real life situation, creativity and active practice, digital competence of both students and AS, critical thinking and evaluation (see Appendix 14). By using digital applications, tools, materials and resources, students can create content, interact with experts, collaborate with peers and participate in simulation activities and work. Personalized experiences put students into the center of learning and allow students to take control of their own learning accordingly (Zogla, Prudnikova, Mykhailenko, 2019), while the smart student is placed in the center of the concept of Smart pedagogy (Daniela, 2018).

So, TDL is effective when the development of knowledge and skills is based on previous experience and is linked to practical work, providing an individual approach to the teaching and learning process. In its turn, the digital learning environment positively influences the interaction between students and AS, reinforces it, allows them to overcome distance, reduces time, stimulates an immediate exchange of opinions, but it is important to balance it with face-to-face communication (Vindača, 2020).

While, covering the idea of educational innovation M.A. Bautista and M.E. Cipagauta points out that it is related to the didactic and methodological strategies and have to be included in educational processes (Bautista, Cipagauta, 2019). As it is important to look for changes and challenges, to respond to them as in national as in international perspective and adapt to them, which means transformation in terms of resources, learning, roles of AS and student, active use of ICT.

Trigger has been needed to hurry up DT in HE and despite all the difficulties brought by Covid-19 pandemic TDL instead of novelty turned into a reality of our life within very short period of time.

TDL strategy has been worked out within the study conducted in accordance to the FLPP project "Life with COVID-19: Evaluation of Overcoming the Coronavirus crisis in Latvia and recommendations for societal resilience in the future (CoLife)" Nr.VPP-COVID-2020/1- 0013, providing the perspective of AS, following Covid-19 pandemic, drawing up the procedure how to redirect weakness and threats into strengthens and opportunities, by implementing necessary changes, so **SWOT analysis** structure has been offered for the situation analysis (see Appendix 15).

Based on SWOT Analysis, educational institutions can choose the appropriate learning strategy (Gurel, 2017). This is a tool for analyzing the current situation both internally (strengths and weaknesses) and externally (opportunities and threats). It provides helpful background

information to form a vision or analyze a problem (Plumb, Kelsey, 2018). The number of indicated weaknesses and threats has significantly exceeded the number of opportunities and strengths. Only two possible strengths have been indicated as useful experience for all parties involved and individual approach to each learner. While the core opportunities cover the possibility to reveal strengths and weaknesses in educational system, new challenges, promotion of professional development, improvement of digital skills, improvement of self-sufficiency of learners. As for the weaknesses the following elements have been specified: less quality of teaching/learning process, low quality of communication, lack of technical aids and material, no developed digital competence of all parties involved. Finally, the threats and risks are similar to weaknesses, additionally specifying next COVID waves, uncertainties in educational policy and difficulties to organize the teaching/learning process. Besides this, the necessity to implement TDL is emphasized and approved (Vindača, Ļubkina, Abuže, Ušča, 2021).

The author believes that the effective TDL is possible, only if the updated trends and challenges in HE are considered, in on-going basis.

To find out whether there is a significant difference in the updated trends and challenges in HE the systematic review of official reports has been conducted within the FLPP project "Implementation of Transformative Digital Learning in Doctoral Program of Pedagogical Science in Latvia (DocTDLL)" lzp-2018/2-0180. The understanding of already listed trends and directions is established contributing to the discussion of TDL following Covid-19 pandemics for effective teaching and learning in HEIs. Selection of the corresponding strategy depends on the vision of the HEI considering the respond to the highlighted challenges and changes (see Appendix 16). The following retrospective has been highlighted: methods of communication and collaboration; offered hybrid teaching/learning; new methods and approaches for teaching/learning, assessment and evaluation; development of digital skills of all parties involved; modernization and implementation of innovations in teaching/learning environment. Moreover, the trends, specified before Covid-19 kept unchanged: internationalization, LLL, student learning-centered approach, e-learning and DT. Thus, the list of already specified trends in HE should be expanded with those highlighted by Covid-19 unaccepted situation (Vindača, Ļubkina, 2021 b).

TDL offers broad connectivity with the external environment, with ICT being a powerful tool to transform and facilitate teaching and learning, tailoring the most advanced and effective teaching and learning experiences to the needs of all learners, fostering relationships between

students and AS that can be demonstrated and further enhanced through collaboration and partnership, communication and connectivity that can provide many other opportunities. The pedagogical process is the purposefully organized interaction between people to promote personal development and socialization of both students and AS. The process is always in development, in constant change, under the influence of the environment and the actors involved (Žogla, 2021), ensuring the smartness of the pedagogical process (Daniela, 2018). While the introduction of the TDL context in HE complicates the work of AS, because it requires an important means to achieve the goal in the pedagogical process, to ensure the effective study environment, and to improve the development process of the students' personality and self-experience (Špona, 2022).

Primary conclusions:

Summarizing the core doctrines of TDL and its strategic and practical implementation in HEIs, it can be concluded that the relevance of TDL as the context of the current PhD research is evident when considering the same three dimensions: international, European and Latvian. As DT is reflected in a global initiative by UNESCO addressing the need to rethink teaching and learning to face new challenges and trends (UNESCO, 2021 a), in the Digital Europe Program (DigitalEurope, 2020), Digital Education Action Plan 2021-2027 (European Union, 2020), in the National Development Plan of Latvia (Saeima of the Republic of Latvia, 2020), in the Sustainable Development Strategy of Latvia up to 2030. It is also relevant to the strategies of technical universities, studied within the current research, following the emphasis of non-teacher trained AS.

In addition, the research indicates the basic requirements for the successful implementation of DT and TDL, defines the model of DT, encompasses the institutional strategy and student-centered service (Alcatel-Lucent, 2018), meets the requirements and demands (Tulchinskij, 2017), and transforming the vertical structure of pedagogical paradigm (Blūma, 2016) by optimizing and revising the core elements and feature of the study process (Uvarov et al., 2019), providing the personalization of teaching and learning (Elliott, 2017). Beyond that, based on J. Mezirow transformative theory, new experiences and perspectives are achieved by performing transformative learning steps, including assessment procedures (Taylor, Cranton, 2013) and attaining self-confidence in new roles and relationships (Mezirow, 2003).

As a summary of the results of the theoretical investigation, the definition of transformative digital learning is offered, it is the process of individualized, lifelong spontaneous or planned technology - enhanced learning, changing and updating educational outcomes and achievements, content, methods and organizational forms, their adaptation to the rapidly evolving digital environment, including physical and philosophical change or transformations, to meet the growing demands of learners to achieve rich intellectual property by defining new perspectives and adopting a personal worldview in line with value-added learning.

Moreover, the fundamental and applied research projects become an integral part of the situation analysis and further planning of measures concerning TDL (Life with COVID-19: Evaluation of Overcoming the Coronavirus crisis in Latvia and recommendations for societal resilience in the future (CoLife)" Nr.VPP-COVID-2020/1- 0013; FLPP project "Implementation of Transformative Digital Learning in Doctoral Program of Pedagogical Science in Latvia (DocTDLL)" lzp-2018/2-0180). The list of recommendations for the successful implementation of TDL is offered using the SWOT analysis (Sharma, 2005; Renault, 2020), and the list of updated trends in HEIs have been highlighted, based on Rumbley, 2020; Schleicher, 2020; Recio, Colella, 2020; IAU, 202; Pearson, 2020): methods of communication and collaboration; offered hybrid teaching and learning; new methods and approaches for teaching/learning, assessment and evaluation; development of digital skills of all parties involved; modernization and implementation of innovations in teaching and learning environment, enlarging the already existed: internationalization, LLL, student-centered approach, e-learning and DT. This is how TDL is brought from novelty to the reality of today's HE system, where Smart pedagogy (Daniela, 2018; Uskov et al., 2018, Karkazis et al., 2019; Meng, Jia, Zhang, 2020) and Engineering pedagogy (Sell, Ruutmann, 2015; Ruutmann et al., 2022) are transformative forces and should be considered for the formation of PCAS of non-teacher trained AS, ensuring DT of HEIs.

In order to show the influence of AS in the context of TDL introduction and implementation in HE, the next chapter analyzes possible assessment criteria and indicators of PCAS, considering the current trends and challenges and the perspective of DT in HEIs to ensure the effective process of teaching and learning in HE, ensuring the concept of smart student and smart AS.

Summary

This Chapter focuses on theoretical foundation of the formation of PCAS.

Firstly, it examines the concept of AS of HEIs in three specified dimensions: international, European and Latvian, justifying the essential points such as definition of AS, the key functions and activities of AS, ranks systems and career path, further perspectives for the development of HE in terms of AS and academic career planning and highlighting the core aspects such as paradigm shift in education, effective use of ICT in education, following DT, and LLC. Emphasizing two types of AS: teacher-trained AS (with pedagogical background) and non-teacher trained AS (with no pedagogical background), while the focus of current PhD thesis is on non-teacher trained AS. Moreover, the proposed Latvian academic career framework is presented, showing the stages of mastery achievement for non-teacher trained AS in the Latvian perspective.

Secondly, it examines the definition and structure of PC, specifying the term of competence in HE, the concept of competence in the context of AS, emphasizing the experience and active in practice aspects, the conceptual formation of the structure of PC, highlighting the cycle nature of its formation and development, the comparative analyses of PC concepts and frameworks in several perspectives.

By summarizing the primary tenets, the author of PhD research offers such definition of **pedagogical competence of academic staff is a set of knowledge, skills and psychosocial factors, for enhancing the effective teaching/learning process in the higher education institutions, considering the study-environment, student-centred approach, lifelong learning and continuous development to meet the requirements of updated trends in the field of educational science such as innovations, digitalization and globalization.**

Thirdly, it examines the implementation of PC through pedagogical theories and practices, where the previous experience is specified as a core aspect for further development such theories as constructivism, connectivism and activity theory, where Smart pedagogy and Engineering pedagogy are transformative forces and should be considered for the formation of PCAS for non-teacher trained AS, ensuring DT of HEIs.

The chosen theories provide the best theoretical foundation for the understanding how the process of PC formation is conducted, forming **the conceptual framework** for the further developed didactic framework for the assessment and development of PCAS.

Moreover, the comparative analyses of effective implementation of PC are conducted in the same three perspectives: international, reflecting Canadian perspective; European, reflecting perspectives of Denmark, the UK, Ireland, Estonia and Lithuania, by drawing parallels with Latvian perspective.

Finally, the TDL context is justified in the formation of PCAS, covering the primary tenets in the parallel comparison of traditional and transformative approaches, considering the further steps of its effective implementation in the scope of modern trends and challenges in HE, covering the SWOT analyses demonstrating the relevance of the TDL context within the current PhD research, offering **the definition of transformative digital learning as the process of individualized, lifelong spontaneous or planned technology - enhanced learning, changing and updating of educational results, content, methods and organizational form adopting them to the quickly evolving digital environment, including physical and philosophical change or transformation to meet growing demands of learners to achieve rich intellectual property by defining new perspectives and adopting personal worldview accordingly value-created learning**.

Based on the main findings of Chapter 1, it can be concluded that the development of PCAS in HEIs should be driven by the purposeful interaction between management and AS that forms the clear academic career framework within the educational institution, including the regular assessment procedure of PC, defining a common strategy for continuous development, planning the defined tasks and implementation of measures, creation and maintenance of a motivating environment for the innovative changes, considering the TDL context.

Chapter 2 of the PhD thesis focuses on the assessment process of PCAS in general, while further specifying the proportion of different criteria and indicators for non-teacher trained AS in terms of self-assessment and students' assessment, further with the evaluation of the mastery level.

2. DIDACTIC FRAMEWORK FOR ASSESSMENT AND DEVELOPMENT OF PEDAGOGICAL COMPETENCE OF ACADEMIC STAFF IN TRANSFORMATIVE DIGITAL LEARNING CONTEXT

Chapter 1 focuses firstly on the defined classification of AS in general and secondly on the specification of two different types of AS: teacher-trained AS and non-teacher trained AS, covering the general aspect and emphasizing the core concept of the current PhD thesis on non-teacher trained AS, considering professionals from various disciplines, especially engineering, but with no pedagogical background.

Therefore, while PC is the core requirement for both classified types, Chapter 2 focuses on the assessment process of PCAS in general, while further specifying the proportion of different criteria and indicators for non-teacher trained AS. The background of the didactic framework for assessment and development of PCAS is based on the conducted analyses of PCAS through pedagogical theories and practices of Chapter 1 and covers the implementation process in the TDL context, where Smart pedagogy and Engineering pedagogy are transformative forces of the formation process. In addition, three types of assessment tools are specified: self-assessment, students' assessment and mastery-level evaluation, which form the common pattern of the assessment process of PCAS. Academic career planning requires a clear understanding of the current position both in the aspect of pedagogical competence and in the aspect of mastery for planning and application of future development perspectives.

2.1. Design, Structure and Implementation of Didactic Framework of Pedagogical Competence of Academic Staff

2.1.1. Design and Structure of Didactic Framework of Pedagogical Competence of Academic Staff

To understand the essence of any pedagogical process, there is a need to clarify the basic concept, key points, terminology and boundaries of general and specific understanding, as well as the ongoing changes, trends and context that reflect the total vision. Despite the fact that pedagogy is concerned with the teaching process by promoting students learning and also is influenced by social, political and psychological development features, the updated understanding is offered.

The focus of current PhD research is on non-teacher trained AS, where research-based knowledge (Fakhrutdinova et al., 2020) and innovation as a knowledge-based outcome (Quintane, Casselman, Reiche, Nylund, 2011) plays an important role, considering the concept of PCAS, the nature and structure of it through pedagogical theories (constructivism, connectivism, activity theory) and practices (in three dimensions: international, the European and the Latvia) in the TDL context with updated challenges, the background for the didactic framework for the assessment of PCAS was developed through four core doctrines: pedagogy of HE (Logvinov, 2003), using Smart pedagogy (Daniela, 2018; Uskov et al., 2018, Karkazis et al., 2019; Meng, Jia, Zhang, 2020) and Engineering pedagogy (Sell, Ruutmann, 2015; Ruutmann et al., 2022) as transformative forces and adding the pedagogical digital competence framework of educators (Punie, Redecker (Eds.), 2017) (see Table 2.1).

In accordance to comparative analyzes, presented in Table 8, the four-group approach of PCAS is presented, reflects the importance of teaching and learning as a high priority for the non-teacher trained AS, while two more aspects should be added: research-innovative, reflecting professional aspect; while social one, considering the study environment, reflects also the digital with effective use of ICT. The significance of digital aspect is emphasized from the perspective of AS in both dimensions: self and professional development and facilitating and empowering the progress of students, following DigCompEdu. While research nowadays is directed towards innovative principles, methods, approaches and forms of collaborative productivity between AS and students, which contribute to students' professional self-learning (Špona, 2022).

It is important in engineering teaching and learning to distinguish between different paths, analysis, evaluation and creation, providing the ability to apply knowledge, ensuring reflective practice through multidisciplinary, communication, collaboration and effective use of innovative digital research-based solution (Ruutmann, 2020).

Additionally, the study environment aspect should be considered, as it influences the understanding and effectiveness of the study process in HEIs (Suciu, Mata, 2011), with the close connection to corresponding research field (Ryegard, Apelgren, Olsson, 2010).

Table 2.1

Background for the Didactic Framework for the Assessment of PCAS

(created by researcher)

Teaching/ Learning Aspect	**HE Pedagogy** (Logvinov, 2003)	**Smart Pedagogy** (Daniela, 2018)	**Engineering Pedagogy** (Sell, Ruutmann, 2015)	**DigCompEdu** (Punie, Redecker (Eds.), 2017)
personalization/ individualized study process	Whom to teach	Smart learner in the center of the process, support	To consider individual differences of students	Empowering learners for effective use of ICT on individual differences, to facilitate
goals and learning outcomes/ achievements	What to teach, what to achieve	Driven force to reach the result	The certain goals to educator and the certain outcomes to students	Self-regulated process, considering professional engagement, communication, collaboration and continuous development
course content	What to teach	Including digital materials	Create and design the course content in accordance to specified goals and outcomes	Self-regulated process, considering professional engagement, communication, collaboration and continuous development
study environment	Where to teach	Offline and online	ICT should be considered, in accordance to specified goals and outcomes	Online
methods, models, strategies, approaches	How to teach	Including digital solutions, networking	Appropriate in accordance to specified goals and outcomes, considering individualization, ICT	Digital solutions (selection, creation, modification, management and protection)
assessment/ feedback	How to assess	Cyclic process	To choose in accordance to specified goals and outcomes, diversity	Types, strategies, regularities to provide feedback
reflection	What changes and amendments to implement	Cyclic process, centrifugal effect	To make improvements based on it, conducting the detailed analyses	To plan improvements, based on the analyses

So, the didactic framework for the assessment and development of PCAS is proposed for the PhD research needs, in which three main groups/aspects of PCAS are specified: learning and assessment, research -innovative and digital (see Figure 2.1).

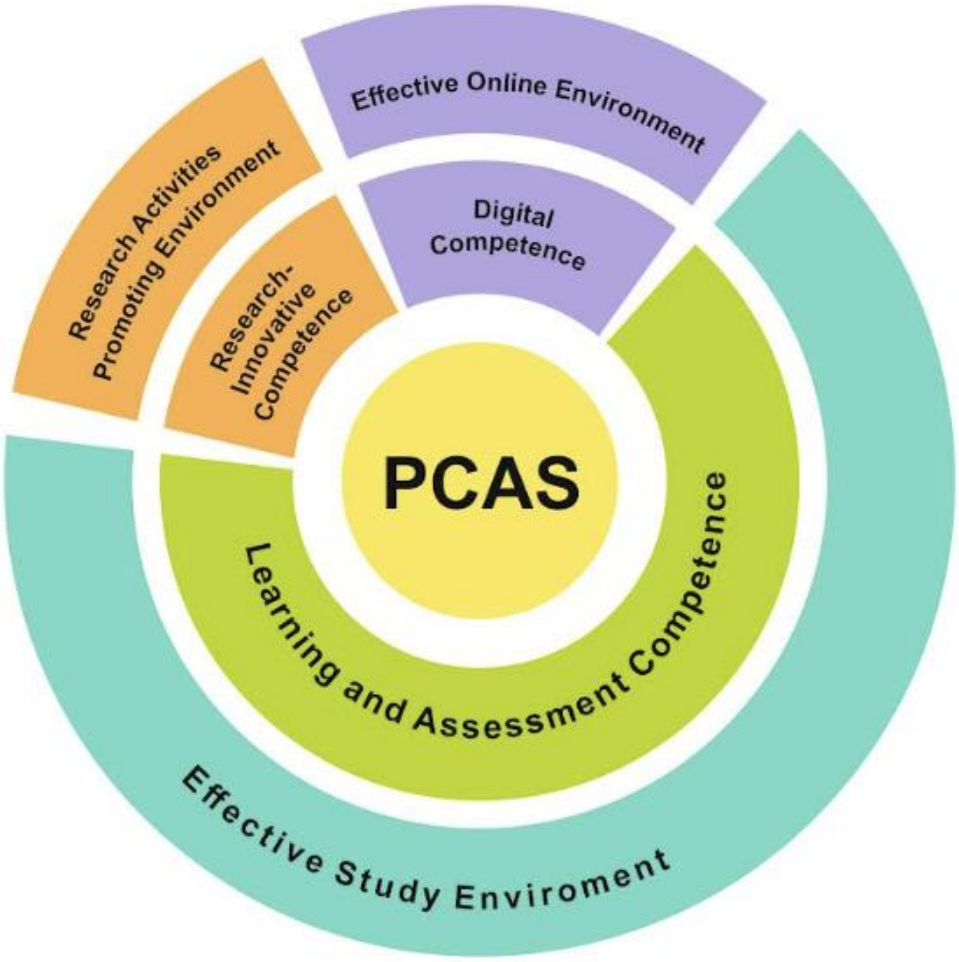


Figure 2.1 **Didactic Framework for the Assessment of Pedagogical Competence of Academic Staff** (Vindača, Ļubkina, 2022)

The didactic framework for the assessment of PCAS is developed, considering the necessity of non-teacher trained AS, with no pedagogical background, following three dimensions: firstly, didactic (teaching and learning), secondly, updated trends in HE, covering TDL context and finally, the required outcome – the development and improvement of PCAS. That means the professionals of the field have to pay more attention to their learning and assessment, while linking with research – innovative and digital aspects. By forming their common work, where teaching and learning process is conducted based on research-innovative

or/and digital approaches, ensuring the concept of smart AS. The didactic framework was presented at 14th International Conference on Education and New Learning Technologies (EDULEARN21), Spain, in July 2022.

The offered proportion makes almost more than half for learning and assessment, while it can be adopted according to the research needs. Moreover, the effective environment plays an important role in the continuous development and improvement of the mentioned aspects within PCAS profile. The considerable attention has to be paid for the previous experience forming the specified competence and be repeated in cycle nature.

The cycle nature of competence formation and development is analysed in Chapter 1.2. of current research, based on experimental learning idea of Kolb (1984) with four stage, namely concrete experience, reflective observation, abstract conceptualization and active experimentation (Kolb, 1984), while in the context of competence implementation (wvdevelopment.org, n.d.) it is updated and competence development cycle is offered for PCAS: firstly, the plan of PCAS development is designed; secondly, the active use in practice through teaching/learning is conducted; thirdly, the evaluation/assessment is offered to check the progress; finally, the feedback is analysed to provide the reflection for further development planning of PCAS.

The plan is to develop PCAS, while during the active experimentation, the process of teaching/learning, the progress check and effectiveness is monitored, afterwards conducting the detailed evaluation through different assessment strategies, forming the background for the next cycle planning, moreover, during feedback and reflection to identify PCAS needs and future perspectives to provide continuous improvement and development. The author believes that continuous self- and professional development of AS ensures the organization of the effective study process in HEI in both students' and educators' perspective.

The continuous PCAS development is only possible by including it in strategic planning at either institutional and state levels, providing support services and empowering AS for continuous development with effective pedagogical practices, research-based approaches, innovation and digitalization of core processes. Next, the implementation process of the offered didactic framework of PCAS needs to be clarified.

2.1.2. Implementation of Didactic Framework for the Assessment and Development of Pedagogical Competence of Academic Staff

The primary tenet of the implementation process is to make the process effective and value-added. Therefore, understanding consistent patterns covering the following aspects is required: the content, the organization of the process, the updated requirements and trends, the roles and the context.

By forming *the didactical content* during TDL the answers to the classic didactic questions: why teach? (goals); what to teach? (content); how to teach? (methods, approaches, organizational forms); who to teach? (requirements for students – the subject of teaching) should be ensured. However, these primary elements have to be enlarged in accordance to the modern trends, challenges and changes, paying special attention to the results and the assessment procedure. So, the above-indicated questions have to be reformulated: how to measure the educational outcomes? what competence have to be developed? how should the learning process be organized to develop the specified competence? what is the structure of teaching and learning process? what is the role of a student? what is the role of AS? etc. (Logvinov, 2003).

Moreover, following the nowadays requirements and challenges the updating procedure should cover the answers to additional questions for HE: what should be continued unchanged, what should be abandoned, and what should be creatively invented afresh? (UNESCO, 2021 a). In addition, it is important to create new paradigms of scientific research and innovative practice of pedagogy, as this is determined by the constant changes in the world and in the perception by requiring the integrated learning, considering the multidimensional character (Špona, 2022).

In the context of *organization and management of the study process* in HEIs, it directly depends on the purpose of the teaching and learning. How to synthesize the teaching and learning with research, innovation and DT, the following steps should be taken: firstly, identify, describe, memorize, show; secondly, compare, contrast, explain with examples, retell, change and express; thirdly, compose, demonstrate, continue the idea, project, develop, solve; fourthly, analyze, categorize, describe, show the difference; fifthly, develop, identify trends, patterns, generalize, recommend, describe; finally, listen, discuss, solve and evaluate (Riskulova, Yuldashova, 2020).

The mentioned steps are covered in DT perspective, where consistent patterns are offered by Öz & Balyer, considering the organization of teaching/learning in TDL context, starting with

the development of strategic plan of DT, reflecting the DT vision, then evaluation and feedback should be organized for further improvements planning, including the necessary trainings and support service to empower AS for the active and affective DT implementation, using rewarding system (Balyer, & Öz, 2018).

The implementation of any pedagogical innovation, despite the obvious necessity, is complex, yet how to motivate AS to implement them (Terziev, 2022). The idea of pedagogical innovation is highlighted, according to the European Strategy for Universities, the following priorities are specified: to strengthen the European dimension in HE and innovative research; to support HEIs as lighthouses of the European way of life with a focus on quality and relevance for future-proof skills and flexible and attractive academic careers, promoting teaching and learning, research, innovation, entrepreneurship, management and leadership activities; to empower HEIs as change actors in the double green and digital transitions through technological and social innovation; to reinforce HEIs as drivers of the global role and leadership of the EU, through deeper international cooperation (European Commission, 2022). Pedagogical innovations are now directly linked to technological progress (Walder, 2014), covering social dimension, that is related to the continuous professional development and concept of teaching/learning, interdisciplinarity and interculturality; and technical dimension, that is related to tools/instruments and pedagogical methods, models and approaches (Walder, 2015), requiring to redesign and update forms of teaching, learning and assessment (Kukulsk-Hulme et al., 2021), focused on the learners, with a variety of learning spaces and flexible, interdisciplinary paths (O'Neill, McMahon, 2005), the study process has to be based on hybrid solutions representing a good balance between physical presence and digital tools (Pavlik, 2015).

Moreover, to promote flexible and attractive career structures and improve working conditions of AS, where assessment procedure of academic career performance is an integrate part of career planning. The assessment should consider the variety of activities of academics such as teaching, research, entrepreneurship, management or leadership. This will help to improve the attractiveness of research careers and ensure better access to excellent science (European Commission, 2022), while the achievement of learning/teaching goals and tasks is based on certain principles focused on special tasks, problem solving and knowledge enrichment in the process of planned and individualized study process (Žogla, 2001). While the dominant teaching/learning in engineering pedagogy is deductive, where the educator takes full control of

the transmission of knowledge – this model regards an educator as an expert and students as a group of novices. The process of learning, thinking, and doing send a powerful message that students receive as information about how engineers work (Ruutmann et al., 2022), adding the concept of smart student as a central component of the study process in today's HE (Daniela, 2018).

In addition, ICT is an essential component of learning and teaching and should be considered. With digital applications, tools, instruments and resources, students can create content, interact with experts, collaborate with peers and participate in simulation activities and work. Personalized and individualized experiences put students at the center of learning and empowers students to take control of their own learning through flexibility and choice (Zogla, Prudnikova, Mykhailenko, 2019). So, to respond to the external forces in an appropriate way HEIs and knowledgeability of AS, and most often wisdom become transforming forces (Žogla, 2021).

The problems of teaching and learning are investigated and studied within didactics as a field of pedagogy (Riskulova, Yuldashova, 2020) or educational sciences (Zogla, 2017), while the new role of ICT changed the educational paradigm from student learning centered to smart student learning-centered (Uskov et al., 2018), where the presence of ICT crucially restrict the study environment, requiring reflective and flexible activities, a variety of new methodologies and personal empowering of student due to digital competence allowing for transformed mutual relations with deep, strategic and personalized learning in educator-student collaborative teams (Mykhailenko et al., 2019). Moreover, providing new highly effective pedagogical practices, continuous professional development of AS, new digital tools, information sources and services; organizational and infrastructural conditions for implementation of necessary transformations (Uvarov et al., 2019).

In the context of non-teacher trained AS, the special attention is paid to several core features: ongoing professional development as essential for mastering the pedagogical competence with reflective practice; educator-student interaction, as AS have the strongest and direct influence on student success and the quality of their learning; collaborative work and practices, developing a collective learning environment, in order to define and pursue-shared goals related to the students' educational success; to be a part of a team (Hewson, Hewson, Parsons, 2015). Effective teaching and learning should consider three categories of specialized knowledge:

1) knowledge about students and learning in its many dimensions (biological, cognitive, emotional, social, cultural, etc.), considering individual differences of students;

2) subject-related knowledge, which refers to knowledge of both the subject matter and the program of the study, covering course content;

3) knowledge related to didactic and pedagogical concepts, processes and strategies that ensure the best possible learning experience for students, considering goals, methods, approaches, strategies, assessment; with critical attitude toward own teaching practices, with the possibility of improvement, openness to debates and the sharing of experiences, forming own biases toward teaching and learning (Zogla, 2017).

Thus, for the effective implementation of the didactic framework for the assessment of PCAS, the didactic content should be updated and transformed in accordance with the highlighted trends and challenges, ensuring the TDL context in HEIs and following the consistent pattern of the organization of the effective process, considering the updated roles of ICT and innovative pedagogy as the overall backdrop to the transformation of the HE system.

Primary conclusions:

By summarizing the theoretical background and conceptual framework of PCAS presented in Chapter 1 and considering the focus of the current PhD research that is on non-teacher trained AS, the roadmap for the design and structure of the didactic framework is grounded in engineering pedagogy that is a basis of effective research-based and innovative teaching and learning in HEIs, providing reflective practice (Ruutmann et al., 2022), in synergy with digital competence framework for educators (Punie, Redecker (Eds.), 2017) and the concept of Smart pedagogy with the effective use of ICT (Daniela, 2018; Uskov et al., 2018, Karkazis et al., 2019; Meng, Jia, Zhang, 2020), including three core criteria: learning and assessment, research – innovative and digital.

In addition, by forming the didactic background for the implementation of PCAS, the answers to the main didactic (teaching/learning) questions were formed: why, what, how and whom to organize the study process (Logvinov, 2003), expanding to include today's requirements, coverage, what transformation should be conducted, what roles are played for the perspective of students' and AS, how effectiveness ca be measured (Uvarov et al., 2019), paying particular attention to the TDL context.

For an effective implementation of the offered didactic framework for the assessment of PCAS, the cyclicity nature should be reflected, since continuous self- and professional

development is possible only after the feedback gained and further planning of improvement and development. As continuous self- and professional development of AS ensures the organization of an effective study process in HEIs from both students' and AS perspective, the continuous development of PCAS is only possible by including it in the strategic planning either at institutional and state level and support services are provided to enable AS to continuous evolve with effective pedagogical practices, research-based approaches, innovation and digitalization of core processes.

2.2. Criteria and Indicators for Assessment of PCAS

During the leading-up stage of the PCAS framework, the concept of AS was analysed in three perspectives: international, the European and Latvia (Houston, Mayer, Paewai, 2006; Cadez, Dimovski, Groff, 2017; Schwartz et al., 2017; Vidnere, Bogdanova, 2019; Vaidya et al., 2022), specifying two types of academic staff: teacher-trained AS and non-teacher trained AS (Voss, Gruber, 2006; Graham, 2015; Kersten, 2018). In addition, the following future perspectives of HE in terms of AS were highlighted from the theoretical analyses: paradigm shift in education (Jacobs, Farrell, 2001; Blūma, 2016); effective ICT implementation by ensuring DT (Elliott, 2017; Alcatel-Lucent, 2018; Dobrica, 2019; Zogla, Prudnikova, Mykhailenko, 2019) and lifelong learning (Ates, Alsal, 2012; Fernāte, Birziņa, Kurlovičs, 2014).

Moreover, the theories on the organization of the study process in HEIs (Žogla, 2017; Valtonen et al., 2021) and the interrelations of teaching/learning components (Petrenko, 2015; Subakir, 2017; Schieber, 2018; Kaplan, 2021; Fernāte, Birziņa, Kurlovičs, 2014; Andersone, 2017; Žogla, 2018) were analysed, forming the background of the pedagogical competence (Suciu, Mata, 2011; Febrianis, Muljono, Susanto, 2014; Aimah, Ifadah, Bharati, 2017; Sahana, 2018; Novianti, Nurlaelawati, 2019; Fakhrutdinova et al., 2020; Yue, Li, Yu-Sheng, 2022), using Smart pedagogy (Daniela, 2018; Uskov et al., 2018, Karkazis et al., 2019; Meng, Jia, Zhang, 2020) and Engineering pedagogy (Sell, Ruutmann, 2015; Ruutmann et al., 2022) as transformative forces for the development of PCAS in HEIs.

New challenges and trends in HE have a direct impact on the organization of the study process in HEIs. Since the introduction of each novelty is related to the evaluation of its effectiveness, when implementing the PCAS didactic framework, there is a need to determine

the meaning and use of the corresponding elements, and then to clarify the levels of mastery for each of them. Based on the theories mentioned, the criteria and indicators of PCAS were specified with clearly formulated characteristics to show the transition from level to level with the perspective of achieving a qualitatively higher level.

The level of mastery of the competence can be specified by taxonomies of teaching/learning. Therefore, there is a need to analyze the main taxonomies of teaching/learning by creating a clear understanding of the assessment process of competence, considering its further development and filling of teaching/learning objectives.

2.2.1. Assessment through Learning Taxonomies

A taxonomy is a grouping based on similarities (Armstrong, 2010). The following taxonomies were specified for further analyses: Bloom's taxonomy the updated version, Feisel-Schmitz technical taxonomy, New taxonomy, Webb's depth of knowledge, SOLO taxonomy, Gibb's reflective cycle. The comparative analyses are presented in Table 2.2. While Bloom's updated taxonomy is placed as the basis for the further overview, the context of non-teacher trained AS is followed.

Table 2.2

Taxonomies Overview (researchers' concept)

Proficiency level of competence	Feisel-Schmitz Technical Taxonomy	Revised Bloom's Taxonomy	New Taxonomy (Marzano, Kendall, 2007)	Webb's Depth of Knowledge	SOLO Taxonomy	Gibb's Reflective Cycle
⇑			Self-system thinking			
		Create	Metacognition		Extended abstract	Action plan
	Judge	Evaluate	Knowledge Utilization	Argumentation	Relational	Conclusion
	Analyze	Analyze	Analysis	Analysis	Multi-structural	Evaluation Analysis
	Explain	Apply			Uni-structural	
	Compute	Understand	Comprehension		Pre-structural	Feelings
	Define	Remember	Retrieval	Facts Knowledge		Description

Any competence formation, pedagogical competence is not an exception, requires the levels of achievements, therefore taxonomies of learning can be applied to the competence mapping process. Originally, Bloom's six-level taxonomy provides the following achievements in knowledge and cognitive domains: starting with recalling facts and basic concepts → moving to understand and explaining ideas and concepts → applying and using concepts in new situations → analyzing and drawing connections between ideas and concepts → evaluate and make decision → create and produce new original ideas and concepts (Armstrong, 2010).

By combining the main features of learning taxonomies, the following elements differ: final judgment of optimal solution (Hogfeldt, n.d.); self-system thinking by examining motivation, emotional response, efficacy and importance (Marzano, Kendall, 2007); the augmentation or extended thinking for real world contexts (How else can the knowledge be used?) (Webb, 1997); structural aspect with extended abstract (reflecting, generalizing and hypothesize) (Biggs & Collis, 1982) and action planning for appropriate changes and applications (Gibbs, 1988). It is not sufficient to gain an experience in order to gain new knowledge without reflecting, the generalization is required, by testing in new situations (Gibbs, 2013). While the updated version of Bloom's taxonomy, considering some elements from others, in which the interchange of the positions of the last two aspects have been specified, as must be done prior to creating a new concept and planning the assessment process. Further analyses were performed based on the overview of taxonomies, presented in Table 2.2, by providing simple and transparent formation and development of PCAS, by moving from simple to complex and considering the emphasize of the current research on non-teacher trained AS, adding the levels of mastery achievement for non-teacher trained AS, specified in sub-chapter 1.1. Thus, the assignment of competence levels and mastery achievements was developed (see Figure 2.2).

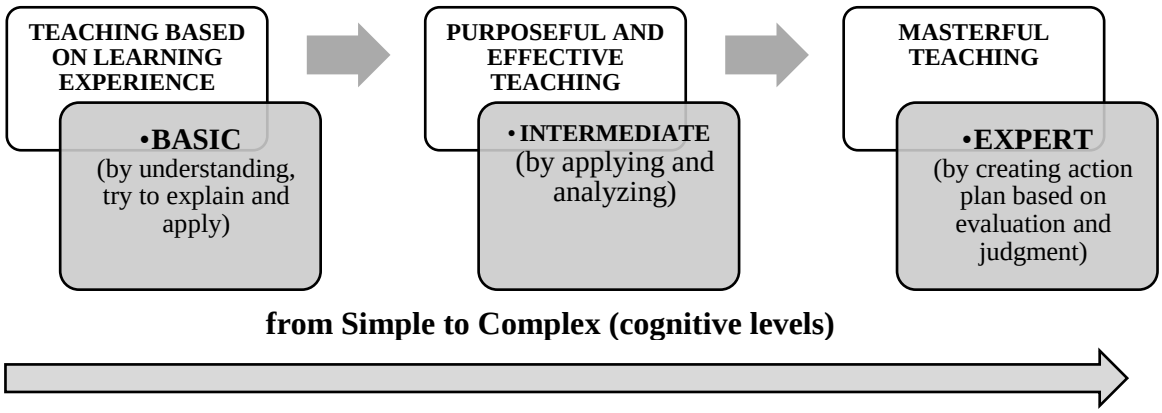


Figure 2.2 **Assignment of Competence Levels and Mastery Achievements, following the Overview of Taxonomies** (researcher's concept)

So, three levels of competence development: basic, intermediate and expert correspond directly to the mastery achievements of non-teacher trained AS: teaching based on learning experience; purposeful and effective teaching and masterful teaching, where the creation of action plan is conducted based on the analyzes and judgments. While the future perspective of PCAS development should be done in accordance with the detailed assessment process, considering clearly defined criteria and indicators through different assessment strategies.

2.2.2. Criteria and Indicators for Assessment of Pedagogical Competence of Academic Staff

Assessment is an essential component of learning and teaching as it allows to evaluate, judge and improve the specified competence, covering knowledge, skills and psychosocial factors (Vitello, Greatorex, Shaw, 2021). Assessment is commonly understood to have a formative and a summative purpose. The formative assessment aims to collect evidence of the level of competence in order to clarify further development perspectives; while summative assessment is used to assess final achievements based on the outcomes achieved. This is why it is so important for AS to learn in a self-regulated manner in order to monitor their own progress and plan for further development (Redecker, Johannessen, 2013). This is a key feature for the work and activities of AS in HEIs.

By combining the doctrines of several scientists the following key features are specified as the main achievements of AS: outcomes that are directly linked with didactic background of

the study process in HEIs (Ruutmann, 2020), the personal transferable outcomes, such as independent work, cooperation and communication skills, and using information, as well as the generic academic outcomes, such as thinking critically and synthesizing ideas and information, are learning outcomes that are supposed to be produced along with the subject-based outcomes (Dagar, Yadav, 2016); the research and innovation-based outcomes that are produced to show the progress and effective usage (Ruutmann et al., 2022).

In order to determine specific assessment criteria for the assessment of PCAS, it is important to become familiar with the theoretical aspects of the organization of study process in HEIs and the existing assessment of PC, basic principles and the impact of assessment process on the further development and improvement of PC, considering the strategic guidelines. Since in accordance with the proposals of the strategic documents of Latvia the academic career development of AS is directly linked to the achieved mastery level in the specified fields, taking pedagogical competence as a background (Ambasz et al., 2022). In order to reduce the fragmentation of research, innovation and teaching/learning activities and to improve and develop the mastery of AS, the designed didactic framework for PCAS provides the conceptual description of the core elements and criteria needed to facilitate the further development and PCAS improvement planning.

The criteria were formed, considering the outcomes of several studies, by summarizing the data the following features should be incorporated among criteria and indicators: rethinking of teaching and learning, considering the deep understanding of innovative and DT processes that form the essential components of qualitative education, including effective and excellent pedagogical work performance (Jansone-Ratinika et al., 2021); the self-reflection tools as a primary component for further development and improvement planning (Costa, Castano-Munoz, Kampylis, 2021); the purpose of the assessment, including the continuous professional development and mastery levels achievement, following the updated trends, innovation and challenges (Liakopoulou, 2011).

Therefore, two perspectives are considered when developing the PCAS criteria: comparative analyses of the key groups of PCAS frameworks (see Table 8), covering teaching/learning group, reflecting pedagogical aspect; research-innovative group, reflecting professional and individual aspects and social group, emphasizing the study environment (Olsson, Mårtensson, Roxå, 2010; Suciu, Mata, 2011; Fakhrutdinova et al., 2020); and general educational content formed by the didactic background (Tab. 2.1) of seven primary elements of

the study process of HEI affiliated with Tallinn University of Technology (Ruutmann, Sell, Lohmus, 2018), using Smart pedagogy with the effective use of ICT as the primary tenet (Daniela, 2018; Uskov et al., 2018, Karkazis et al., 2019; Meng, Jia, Zhang, 2020) and Engineering pedagogy with reflective practice as primary tenet (Sell, Ruutmann, 2015; Ruutmann et al., 2022) as transformative forces of the process.

In addition, based on the concepts of different authors regarding PCAS (Suciu, Mata, 2011; Febrianis, Muljono, Sustanto, 2014; Aimah, Ifadah, Bharati, 2017; Sahana, 2018; Novianti, Nurlaelawati, 2019; Fakhrutdinova et al., 2020; Yue, Li, Yu-Sheng, 2022), the outstanding criteria of PCAS are formed by:

- **learning and assessment criterion** (responding to general education content) for effective and excellence pedagogical work in HEIs, answering the key didactic questions: why, whom, what, when, how much, with what and how to organize learning and assessment process (Logvinov, 2003), additionally considering individual differences of students and learning environment (Ruutmann, Sell, Lohmus, 2018);

- **research -innovative criterion** (responding to the updated trends, innovations, challenges, etc., reflecting professional and individual aspect), considering multidisciplinary and multidimensionality (Illeris, 2013), and the focus on AS with no pedagogical background, where research and innovations of the specified field are primary tenets (Voss, Gruber, 2006);

These two criteria were analyzed in the international and European perspectives, drawing the parallels with the perspective of the Baltic States, where learning and assessment criterion is reflected through teaching/learning competence or knowledge/area of activity (see Appendix 17), while research – innovative criterion is reflected through research competence, scientific qualification, professional values and/or reflective practice (see Appendix 18).

- **digital criterion** (responding to the DT and following the TDL context), the whole study process of HEIs should be transformed (Uvarov et al., 2019), as TDL is the process of individualized, lifelong spontaneous or planned technology-enhanced learning, changing and updating educational achievements, content, methods and organizational forms, adopting them to the rapidly evolving digital environment, including physical and philosophical change, to meet the growing demands of learners/students to achieve rich intellectual property by defining new perspectives and adopting their personal worldview according to value-added learning (Vindaca, Lubkina, 2020), using Smart pedagogy (Daniela, 2018; Uskov et al., 2018, Karkazis

et al., 2019; Meng, Jia, Zhang, 2020) and Engineering pedagogy (Sell, Ruutmann, 2015; Ruutmann et al., 2022) as transformative forces of DT in HEIs.

As a follow-up to the specified criteria, the indicators for self-assessment and students' assessment were offered (see Table 2.3), emphasizing the necessity to provide the synergy of learning and assessment with research-innovative and digital criteria, while the proportion of the indicators of each of the specified criterion differs, since in the context of current research the focus is on non-teacher trained AS with no pedagogical background, where the core criterion is learning and assessment, while two others complete the current understanding of PCAS by responding to tectonic paradigm shifts that have taken place in higher education.

The offered didactic framework of PCAS is realized in targeted action, cyclical and dynamic, in order to consider the needs of AS of HEIs. It is based on the self-assessment of AS from two perspectives: importance and practical use. Additionally, drawing parallels with the students' assessment of the study process, evaluating the practical use of indicators by AS. While for the evaluation of mastery level, the assignment of competence levels and mastery achievements is offered, following the overview of several taxonomies (see Table 2.2), which specifies three steps from simple to complex actions: by understanding and trying to explain and apply, corresponding to basic level; by applying and analyzing at the intermediate level and by creation of action plan based on evaluation and judgment.

Table 2.3

Criteria and Indicators of PCAS (researcher's concept)

Criteria of PCAS	Indicators
1. Learning and Assessment Criterion	1.1. Individual differences of students, personalization
	1.2. Goals and learning outcomes
	1.3. Study course content
	1.4. Teaching methods, models and strategies
	1.5. Effective study environment
	1.6. Assessment and feedback
	1.7. Reflection

Criteria of PCAS	Indicators
2. Research -innovative Criterion	2.1. Professional engagements
	2.2. Organizational communication
	2.3. Professional collaboration
	2.4. Reflective practice
	2.5. Continuous self/professional development
3. Digital Criterion	3.1. Selection of digital resources
	3.2. Creation and modification of digital resources
	3.3. Management, protection and sharing of digital resources
	3.4. Empowering learners for effective use of digital resources
	3.5. Facilitating learner's digital competence

In the current PhD research, the offered overview of taxonomies is generated using the three-level approach offered by the Danish Universities Denmark. These are:

- Level 1 - an entry level, where AS within the scope of own teaching and under guidance, can plan, implement and evaluate teaching/learning, the focus is on the interaction with students;

- Level 2 - the starting point, where AS within the scope of his or her own discipline, is capable of analyzing, organizing, implementing, evaluating and developing study courses and their supervision, the attention to both interaction with students and colleagues is increased;

- Level 3 - a mastery stage, offering competence development opportunity within teaching/learning supervision and education, for ensuring the dynamic development for AS with updating and maintenance of PC, with gradual development of a scope and repertoire of teaching/ learning, supervision and examination practices, increasing collegial and leadership responsibility for the development of teaching and learning (Universities Denmark, 2021).

By conducting the cross-analysis of the offered competence development three-level approach with mastery level evaluation, then Level 1 corresponds to the Basic Mastery Level; Level 2 corresponds to the Intermediate Mastery Level and Level 3 corresponds to the Expert Mastery Level.

So, by designing the evaluation tool for mastery level, the descriptors for each specified indicator were offered in compliance with three-level approach. Moreover, a common European

framework for digital competence of educators developed by C. Redecker and Y. Punie in 2017 was used as a background for the formation of PCAS descriptors by adopting it to the needs of current PhD research.

The mentioned framework defines levels for the classification and assessment of educators' digital competence by distinguishing three types of competence, including educators' professional competence, educators' pedagogic competence and learners' competence and describing six corresponding fields: professional engagement, digital resources, teaching and learning, assessment, empowering learners and facilitating learners' digital competence (Punie, Redecker (Eds.), 2017). While in the context of current PhD research only primary tenets consistent with the PC concept are integrated into the offered descriptors of PCAS indicators, performance-based components are considered. The added value of the framework offered is therefore that it provides: a background that can lead as a guide to the levels indicated; a template allowing to develop a self-assessment tool as a basis for further improvement planning; and a reference point to validate the completeness and approach of its effectiveness and future use.

It is well known that every learner/student is unique and that the same methods and approaches do not fit well for most. Personalization is the process of tailoring instruction to the learning needs, learning preferences, and specific interests of different learners (Bray, McClaskey, 2013). This is central element considering the student-centered approach (Schieber, 2018). To frame the three-level approach for the indicator "Individual Differences of Students, Personalization" the descriptors in Table 2.4 are specified.

Table 2.4

Learning and Assessment Criterion
Indicator "Individual Differences of Students, Personalization" (created by researcher)

Mastery Level	Descriptor
Level 1 Basic	Individual differences of learners *are considered* (speed, special needs, cultural differences); to be aware of different pedagogical strategies that can support personalization, by providing activities at different levels and speeds, try *to apply* them effectively
Level 2 Inter-mediate	Individual differences of learners *are considered* and the study process is accordingly *adopted*; to select and *apply* some learning activities (quizzes, games, etc.) that allow learners to proceed at different speeds, select different levels of difficulty and/or repeat activities previously not solved adequately; when sequencing and implementing learning activities, to allow for different learning pathways, levels and speeds and flexibly *adapt* strategies to changing circumstances or needs.
Level 3 Expert	Individual differences of learners *are considered* and the effective interaction and positive study environment are provided; in case of necessity the individual learning planes are designed which allow all learners to follow their individual learning needs and preferences; to reflect on, discuss, *re-design, create and innovate* pedagogic strategies for personalizing education.

The theories explored in sub-chapter 2.2. all have one central element in common – the didactic background of the study process in HEI, while still answering classic didactic questions that include goals, content, methods, approaches, organizational forms (Logvinov, 2003). The descriptors of the following indicators: "Goals and Learning Outcomes", "Study Course Content", "Teaching methods, Models and Strategies" are specified in Table 2.5.

Table 2.5

Learning and Assessment Criterion
Indicators for Goals, Content and Methods (created by researcher)

Mastery Level	Descriptor
Indicator "Goals and Learning Outcomes"	
Level 1 Basic	Goals and learning outcomes are clearly *considered*, defined, directed and guided.
Level 2 Inter-mediate	Goals and learning outcomes are justified and grounded to enhance pedagogic strategies, basing on *analyses*, trying *to apply* effectively
Level 3 Expert	Goals and learning outcomes are strategically *evaluated*, fitted, linked together, regularly *innovated and renewed* according to the higher education trends; to experiment with and *develop/create* new goals and learning outcomes.
Indicator "Study Course Content"	
Level 1 Basic	Study course content *corresponds* to the defined goals and learners' needs (different level content) and is accordance to the specified topics/theme of the individual discourse
Level 2 Inter-mediate	Study course content is regularly *analyzed* to promote the development of research-innovative competence of learners and secure research supportive environment
Level 3 Expert	Study course content is systematically *innovated and renewed*; to experiment/evaluate with and *develop/create* new formats for creation of study course content
Indicator "Teaching Methods, Models and Strategies"	
Level 1 Basic	The *use/apply* of corresponding methods, models and strategies according to the defined learning goals and outcomes; to use available classroom technologies.
Level 2 Inter-mediate	The *use/apply* of big variety of methods, models and strategies for providing effective study environment; to use different approaches to increase methodological variation, by conducting regular *analyses*
Level 3 Expert	The *purposeful use of methods*, models and strategies; teaching methods, models and strategies are systematically *innovated, renewed and accordingly updated*; to provide a full course of learning modules; to *experiment/evaluate* and *develop/create* new formats and pedagogical methods for instruction; to continuously evaluate the effectiveness of different teaching strategies and revise them accordingly.

As DT takes place in contemporary life, the TDL context should be considered, in addition to answering the essential questions for education, what should be abandoned and creatively reinvented (UNESCO, 2021 a). The most important changes affected the study environment in HEIs. The elements of an effective study environment in HE have been highlighted by M.

Spridzans in his PhD research based on the Communiqué of the Bologna Process of 15 May 2015, specifying three core components:

- clear and open selection procedure of AS, creation of such work environment that confirm the significance of teaching;

- to provide opportunities and encourage AS to implement continuous self- and professional improvement;

- to facilitate scientific-research work, thus strengthening the bond between teaching and research, promotes innovations and the effective use of ICT (Spridzāns, 2022).

To frame the three-level approach for the indicator "Effective Study Environment" the descriptors are specified in Table 2.6.

Table 2.6

Learning and Assessment Criterion
Indicator "Effective Study Environment" (created by researcher)

Mastery Level	**Descriptor**
Level 1 Basic	The features of online/offline study environment *are considered* and *used/applied* accordingly.
Level 2 Inter-mediate	*The use/apply* of big range of options offered by online/offline study environment for effective study process, *analyzing* features.
Level 3 Expert	The purposeful *use/apply* of big range of options offered by online/offline study environment, to *experiment* and *develop/create* new formats; to continuously *evaluate t*he effectiveness and revise accordingly.

Finally, the study process should be evaluated by organizing the assessment procedure accordingly, both for feedback and for reflection, see Table 2.7. Assessment and reflection are part of development and improvement concerns (Sedikides, Strube, 1997).

Table 2.7

Learning and Assessment Criterion
Indicators for Assessment, Feedback and Reflection (created by researcher)

Mastery Level	Descriptor
Indicator "Assessment and Feedback"	
Level 1 Basic	The *use/apply* of clear and appropriate assessment and regular feedback (one in semester; once in a study year);
Level 2 Inter-mediate	The *use/apply* of big variety of assessment and regular feedback (one in semester; once in a study year); the *use* of formative and summative assessment; to *adapt* assessment tools to support the specific assessment goals; *to design* assessment tools which are valid and reliable.
Level 3 Expert	The *use/apply of innovative* assessment and critically reflected feedback; to use a variety of assessment formats, aligned with content and technology standards, and to be aware of their benefits and drawbacks; *to develop/create new formats* for assessment, which reflect innovative pedagogic approaches and allow for the assessment of corresponding competence.
Indicator "Reflection"	
Level 1 Basic	The awareness and *use/apply of traditional* reflection; to compline an overview on learners' progress for the further reflection provision.
Level 2 Inter-mediate	The awareness and *use/apply of regular* reflection and its integration to the study process; to remain update on progress and make informed choices on future learning priorities, optional subjects or future studies.
Level 3 Expert	The *use/apply of critically reflective and innovative* reflection with further actions planning for the effective study process; to assist learners in identifying areas for improvement and jointly *develop/create* learning plans to address these areas, based on the evidence available; to reflect on, discuss, re-design and innovate teaching strategies in response to the found evidence, as concerns learners' preferences and needs as well as the effectiveness of different teaching interventions and learning formats.

In order to foster synergies between the learning process and the research-based approach, the research-innovative aspect is considered. Especially after the impact of Covid- 19, AS of HEIs should be equipped with right competence to provide excellence in research and teaching/learning (European Commission, 2022).

Therefore, the three-step approach to the indicators of research-innovative criteria of PCAS should be formulated, the DigCompEdu was used as a background related to the professional competence of educators by drawing the parallels with PCAS in HEIs, where professional engagements, communication and collaboration are the primary tenets (see Table 2.8).

Table 2.8

Research – Innovative Criterion
Indicators for Professional Engagement, Communication and Collaboration
(created by researcher)

Mastery Level	Descriptor
Indicator "Professional Engagements"	
Level 1 Basic	*To be aware* of communication, collaboration and professional development as key elements of professional engagements while the use of the specified elements is on occasion; the additional encouragement and inspiration are needed
Level 2 Inter-mediate	Still working on deep understanding of communication, collaboration and professional development as key elements of professional engagements; can *use/apply in a variety* of context and for a range of purposes
Level 3 Expert	Know how *to choose/apply the most appropriate* ways of communication, collaboration and professional development; while *keep updating of new* developments and ideas; they are source of inspiration for others and experiment/evaluate with innovations
Indicator "Organizational Communication"	
Level 1 Basic	To be aware and making *basic use/apply* of communication with learners, colleagues, support staff, etc.
Level 2 Inter-mediate	Communication is organized in *effective and responsible way*, by selecting the most appropriate channels, formats and style for a given communication purpose and context; is able to adapt the communication strategies to the specific needs; ethical rules are followed
Level 3 Expert	Communication strategies *are evaluated*, reflected and collaboratively discussed for effective use as for organizational as for individual communication; able *to re-design* communication strategies by *developing/creating* coherent vision or strategy for effective and responsible communication
Indicator "Professional Collaboration"	
Level 1 Basic	To be aware of collaboration options and *use/apply* them to exchange content, knowledge and opinions
Level 2 Inter-mediate	To be aware of a big variety of collaboration options and *use/apply* them to *explore* new pedagogic resources or methods and to get fresh ideas; collaborative knowledge construction
Level 3 Expert	Collaboration is used for reflecting on and enhancing practices and competences, by the insight and resources, generated in the collaborative networks (as being part of), *to get feedback on and improve* the corresponding competence, and to expend the repertoire of pedagogical practices.

The following elements were considered as a roadmap for developing descriptors: professional engagement, organizational communication, professional collaboration (Punie,

Redecker (Eds.), 2017), with an emphasis on professional development through engagement, communication, collaboration, networking, etc. (see Table 2.8). Moreover, similar questions are asked to provide professional engagements, communication and collaboration: why, what and how, as if the goal and purpose are clear, then the effectiveness of the process is achieved (Aronson, Janke, 2015).

Research-based teaching and learning is one of alternatives of problem or project-based teaching-learning, where the focus is on the student/learner and corresponds to the current paradigm shift as promote the construction of competence, considering the reflective practice (Arora, Saxena, Gangwar, 2017). Next, the descriptors of indicator "Reflective Practice" are specified (see Table 2.9).

Table 2.9

Research – Innovative Criterion

Indicator "Reflective Practice" (created by researcher)

Mastery Level	**Descriptor**
Level 1 Basic	*To be aware* of one's development needs; to understand the limits of corresponding competence and training needs.
Level 2 Inter-mediate	To seek to improve and update the corresponding competence through experimentation and peer-learning, by *creative experimentation* with and reflect on new pedagogical approaches; actively seek out best practices, courses or other advice to improve the corresponding competence; to evaluate, reflect on and discuss with peers how *to innovate and improve* educational practice.
Level 3 Expert	To follow current research on innovative teaching and integrate research findings into practice; *to evaluate, reflect* and collaboratively discuss policy and organizational practice concerning pedagogic practice in general; to develop individually or in collaboration with peers, a vision or strategy for improving educational practice; to reflect on and evaluate with colleagues and/or researchers different pedagogical practices, methods and policies, with a view *to developing/creating innovative* methods and approaches.

The three core aspects have been highlighted among the future perspectives of higher education (see sub-chapter 1.1.), lifelong learning is one of them, as the continuous development as personally as professionally should be ensured (Fernāte, Birziņa, Kurlovičs, 2014), therefore the descriptors of indicator "Continuous Self/Professional Development" are specified in Table 2.10.

Table 2.10

Research – Innovative Criterion

Indicator "Continuous Self/Professional Development" (created by researcher)

Mastery Level	Description
Level 1 Basic	*Non-completely regular* knowledge and skills update
Level 2 Inter-mediate	Regular search for suitable training courses, webinars and other opportunities for professional development; *the use/apply* of formal and informal exchanges in professional communities as a source for professional development
Level 3 Expert	To consult a range of possible training opportunities and select those which best fit to the development needs, learning style and time constraints; *to advice peers on innovative* teaching practices, *using* different channels.

The same idea of continuous professional development is highlighted in the context of PC among the following scientists (Suciu, Mata, 2011; Aimah, Ifadah, Bharati, 2017; Novianti, Nurlaelawati, 2019).

Following the specified TDL context of the current PhD thesis, considering the effective use of ICT from the perspective of AS (see Figure 1.2, subchapter 1.1.) and the conceptual framework (see Figure 1.8), next the digital criteria of PCAS are specified, following also the same European framework for the digital competence of educators developed by C. Redecker and Y. Punie in 2017 as a background for the descriptors of digital criteria, specifying two perspectives: the digital resource aspect and the learner aspect.

The first aspect covers three indicators: "Selection of Digital Resources", "Creation and Modification of Digital Resources" and "Management, Protection and Sharing of Digital Resources". To frame the three-level approach for the listed indicators the corresponding descriptors are specified in Table 2.11.

Table 2.11

Digital Criterion Indicators for Digital Resources (created by researcher)

Mastery Level	Descriptor
Indicator "Selection of Digital Resources"	
Level 1 Basic	To *use/apply simple* internet search strategies to identify digital content relevant for teaching and learning; to be aware of common educational platforms which provide educational resources.
Level 2 Inter-mediate	*To adapt* search strategies on the obtained results with modification option; *to filter* results to find suitable resources, using appropriate criteria; *to evaluate* the quality and reliability of digital resources; to select resources appealing for learners; to locate apps and/or games for learners to use; *to provide feedback* and recommendations of the used digital resources.
Level 3 Expert	*to use/apply a variety* of different sources; *to evaluate* the reliability and suitability of content based on a combination of criteria, verifying also its accuracy and neutrality; to provide guidance to colleagues; to set up own repository of (links to) resources, appropriately annotated and rated, and make it available for other colleagues to use; *to promote the use* of digital resources in higher education.
Indicator "Creation and Modification of Digital Resources"	
Level 1 Basic	Creating and modifying resources *using basic tools and strategies*; the offered software is used (ready-made worksheets, quizzes); to create digital presentations for instructional purposes.
Level 2 Inter-mediate	Creating and modifying resources *using some advanced features*, adapting advanced digital resources to a concrete learning context; to understand different licenses attributed to digital resources and know the permission granted for its modification.
Level 3 Expert	Creating, co-creating and modifying resources according to the learning context, *using a range of advance strategies*; *co-create* learning and teaching resources with colleagues; *to create own* apps or games to support the corresponding learning goals and outcomes.
Indicator "Management, Protection and Sharing of Digital Resources"	
Level 1 Basic	Managing digital resources *using basic strategies*; to store and organize digital resources for own future use; to share educational content; too be aware that some resources distributed on the internet are copyrighted.
Level 2 Inter-mediate	To share educational content on virtual learning environments or by uploading, linking or embedding it; *to effectively* protect personal and sensitive content and restrict access; to understand the copyright rules that apply to the digital resources that are used for special purposes.
Level 3 Expert	*To compile comprehensive digital content repositories* and make them available to learners or other educators; *to apply licenses* to the resources published online; professionally publishing self-created content, annotating the resources digitally shared and enabled others to comment, rate, modify, re-arrange or add.

The second, above-mentioned aspect covers two indicators: “Empowering Learners for Effective Use of Digital Resources” and “Facilitating Learner’s Digital Competence”. These two indicators influence the digital competence of the learner/student that is the primary tenet for the effective digital transformation and ICT use (Punie, Redecker (Eds.), 2017).

To frame the three-level approach for the listed indicators the corresponding descriptors are specified in Table 2.12.

Table 2.12

Digital Criterion Indicators for Engagement and Facilitating (created by researcher)

Mastery Level	**Descriptor**
Indicator “Engagement of Learners for Effective Use of Digital Resources”	
Level 1 Basic	*To use/apply* ICT to visualize and explain new concepts in a motivating and engaging way (by animation or video); to employ digital learning activities which are motivating and engaging (games, quizzes).
Level 2 Inter-mediate	To put learners’ *active use* of ICT at the center of the instructional process; to choose the most appropriate tool for fostering learner active engagement in a given learning context or for a specific learning goals and outcome; to use a range of digital technologies to create a relevant, rich and effective digital learning environment; *to reflect on* how effective the teaching strategies employed are in increasing learner engagement and active learning.
Level 3 Expert	*To select, design, employ and orchestrate the use* of ICT within the learning process according to their potential for fostering learners’ active, creative and critical engagement with the subject matter; to reflect on how suitable the different digital technologies are in increasing learners’ active learning and adapt the strategies and choices accordingly; *to reflect on*, discuss, re-design and innovate pedagogic strategies for actively engaging learners.
Indicator “Facilitating Learner’s Digital Competence”	
Level 1 Basic	To *encourage* learners to use digital technologies for information retrieval (on assignments).
Level 2 Inter-mediate	To *implement* learning activities in which learners use ICT for information retrieval; to teach learners how to find information, how to access its reliability, hot to compare and combine information from different sources; to use a range of different pedagogic strategies to enable learners to critically compare and meaningfully combine information from different sources; to teach learners how to quote sources appropriately.
Level 3 Expert	*To reflect critically* on how suitable pedagogic strategies are in fostering learners’ information and media literacy and adapt the strategies accordingly; to reflect on, discuss, re-design and innovate pedagogic strategies for fostering learners’ information and media literacy.

It is necessary to consider what is indicated in the framework offered, that the proposed tool must be adopted to the needs of each HEI, considering the specific educational environment and the relevant context, by developing the criteria and indicators for the assessment of PCAS, with the aim to identify, classify and evaluate the current level of PC and then check progress by repeating the evaluation on a regular basis.

Primary Conclusions

The assessment of the PCAS is important in times of challenges and opportunities for DT in HE. In order to improve PCAS, HEIs must be able to effectively assess and guide the development process of PCAS, since an effective study process can only be ensured by AS with high mastery.

Assessment is an essential component of teaching and learning as it enables the stated competence to be evaluated, assessed and improved (Vitello, Greatorex, Shaw, 2021) as well as to plan for further development (Redecker, Johannessen, 2013). In order to improve the PCAS, HEIs should be able to effectively evaluate the current mastery level and guide the development of PC in individual perspectives, considering the highlighted trends in HE: lifelong learning (Ates, Alsal, 2012; Fernāte, Birziņa, Kurlovičs, 2014), digital transformation (Elliott, 2017; Alcatel-Lucent, 2018; Dobrica, 2019; Zogla, Prudnikova, Mykhailenko, 2019), paradigm shift in education (Jacobs, Farell, 2001; Blūma, 2016), using Smart pedagogy (Daniela, 2018; Uskov et al., 2018, Karkazis et al., 2019; Meng, Jia, Zhang, 2020) and Engineering pedagogy (Sell, Ruutmann, 2015; Ruutmann et al., 2022) as transformative forces of DT in HEIs.

Analysis of the current PhD research on PCAS assessment criteria and indicators confirmed the need to define, and to propose and discuss, detailed descriptors for the PCAS assessment framework appropriate to the environment of HEI that will help to identify the mastery level of PCAS and plan the future improvement perspectives. An effective assessment of PCAS not only helps to improve competence, but also to raise professional standards for further improvements and updates, in order to timely respond and cope with educational changes and challenges, to promote the implementation of innovation and digitalization into the study process of HEIs (European Commission, 2022).

The theoretical foundation of the specified criteria and indicators was based on the European framework for the digital competence of educators developed by C. Redecker and Y. Punie in 2017, considering educators' professional competence, educators' pedagogic competence and learners' competence (Punie, Redecker (Eds.), 2017), while adopting it to the

needs of current PhD research. The descriptors for each indictor were offered based on the offered overview of taxonomies generated using three-level approach of the Danish Universities, including Level 1 as a Basic, Level 2 as an Intermediate and Level 3 as a Mastery.

2.3. Methodology and Tools for Assessment of Pedagogical Competence of Academic Staff

Assessment is the systematic basis for making interference about the teaching/learning process. It is the process of defining, selecting, designing, collecting, analyzing, interpreting, and using data to increase the level of achievements, while the improvements are achieved through supportive feedback from various assessment tools (Rawlusyk, 2018). When evaluating PCAS the following elements are important: assessors, aspect and assessment forms (see Figure 2.3).

The assessment of PCAS should be targeted: by teaching/learning support, by effectiveness or mastery achievement. Therefore, a biannual or annual development review should be applied, reviewing practical application, reporting on improvements and/or developments, including the assessment of PCAS (Kobayashi et al, 2017).

In addition, the special quality assurance of PCAS should be organized within the HEI, where teaching is of high quality, research-based and organized are provided according to good pedagogical theory and practice. With particular attention to developing the skills of AS and supporting the research-based teaching/learning, paying special attention to securing and safeguarding PC development (University of Copenhagen, 2022).

The academic career advancement and promotion is only possible by changing to research excellence or taking on management tasks, considering two approaches: teaching/learning focused and research focused. While the most complicated is to specify the comfortable metrics and indicators. As a good practice example, the Continuing Professional Development Framework for Teaching/Learning established by the University of Edinburgh was analyzed (The University of Edinburgh, 2022). The positive impact on the study process by engaging AS with substantive continuing professional development activities was specified. The following key principles of the process are listed: flexible pathways for individual staff; the emphasize and support of the idea for continuing professional development in academic career; reflective practices and a broad range of opportunities for professional development; symbiotic link

between professional development and practice; robust and credible system for validation and accreditation of professional development; appropriate model to scale up (Kobayashi et al., 2017).

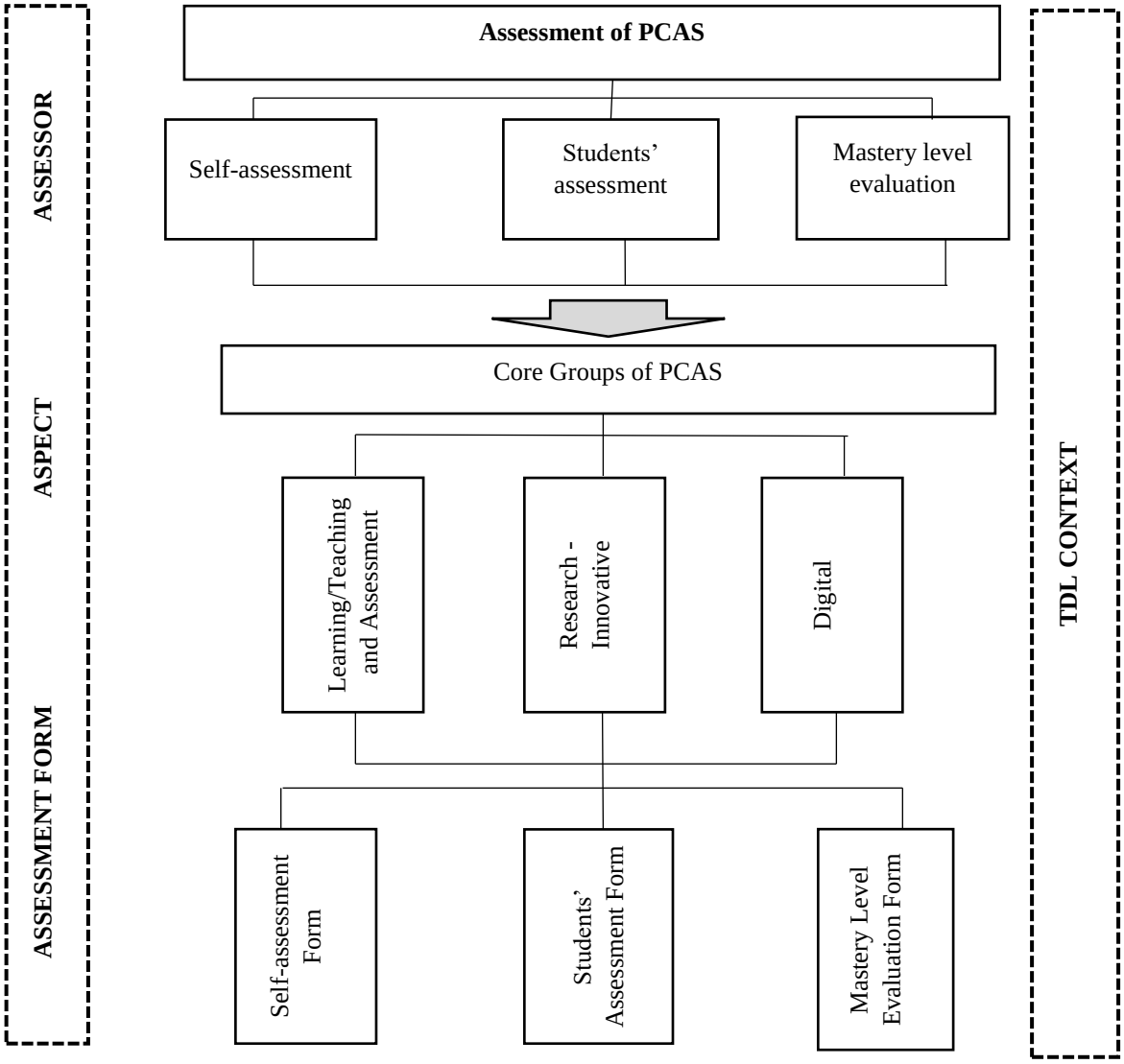


Figure 2.3 **Assessment of PCAS** (researcher' s concept)

Following the purpose of the Advance Higher Education Strategy 2021-2024 to support HE and to respond to the complexity of the world, HE and research have to navigate seismic changes in response to artificial intelligence, the 4th industrial revolution and fundamental shifts in geo-political events. The pivot brought on by the pandemic has created scope of positive changes to maximize the opportunities of digital transformation and smart pedagogy,

emphasizing the effective use of ICT. The Strategy's fifth commitment involves redesigning professional development, specifying the need for continuous professional and pedagogical learning (Marston, Johns, 2021).

The author believes that for the diversified evaluation of PCAS the qualitative measures: self-assessment, students' feedback/assessment and continuous mastery evaluation should be implemented on regular basis. As students' feedback and self-evaluation are just some of the most powerful instruments of the evaluation of teaching, still the input from other sources like feedback from supervisor, students and colleagues is recommended. That is necessary for future career development as well (Ruutmann, Sell, Lohmus, 2018).

Despite of a wide variety of purposes of the assessment process in HEIs, in the context of current PhD research the assessment is specified for the evaluation, measurement, and documentation the academic readiness in the aspect of PC for further development and improvement planning. It is important at the outset to define clearly the boundaries of the offered assessment tools as three types of assessment are span: self-assessment, students' assessment and mastery level evaluation. While the theories explored in this chapter all have one focal element in common – the potential of previous experience as an essential part of learning/teaching. However, it has to be noted that there is no one single theory which would fit absolutely to the specified conception, as there is no one ready-made decision or form of teaching/learning that fits all objectives and perspectives.

By analyzing the interdependence between the key components of pedagogical process: student, educator and content, the additional elements have been specified: the internal and external study environment, that has a fundamental influence on the pedagogical process and has to be taken into consideration for PC formation and mapping (Žogla, 2019 b).

The key components have been justified for each type of interconnections: first, in student-educator context the process personalization and feedback providing; second, in student-subject context the necessity to be relevant to the needs of student, learning ability, self-organization, selection procedure of tools/instruments and assistance/guiding; third, in educator-content context the transformation of specified field content into study content is of key priority together with corresponding organization of study process, development of a course program, selection procedure of methods and approaches and progress assessment.

During the assessment of PCAS two perspectives are important: AS and students, so the corresponding assessment forms should be developed. There is a need to draw the parallels

between the self-assessment and students' assessment. The mastery level evaluation should be offered afterwards.

2.3.1. Importance of Self-assessment for Academic Staff

The primary tenet of self-assessment is that people are motivated to obtain a mutually accurate evaluation of self. People are primarily interested in self-diagnostics to reduce uncertainty about an aspect of self, to provide clear indication of self -conception in relation to the specified field, to affirm and to question existing self-understanding. In summary, self-assessment serves to increase the certainty with which self-knowledge is maintained. It is a scientific and cultural truism that self-assessment, the process by which the self-concept is socially negotiated and modified, is motivated. Motives have long been postulated to color the ways in which people select self-relevant aspects, draw inferences about themselves, make plans for the future, including possible career path, development and improvement concerns (Sedikides, Strube, 1997).

Several scientists have specified three major self-evaluation motives: self-assessment (Spiller, 2012), self-enhancement and self-verification (Sedikides, 1993); (Taylor, Neter, Wayment, 1995); (Sedikides, Strube, 1995). To facilitate the further discussion each motive is specified in Table 2.13.

Table 2.13

Self-assessment Goals (adopted from (Sedikides, 1993), researchers' concept)

Goal	Description
self-assessment	- pursuing accurate self-knowledge; - to be motivated to obtain a consensually accurate evaluation of the self; - to be interested predominantly in the diagnostics of self-relevant information (to reduce uncertainty about an aspect of the self); - to seek diagnostic information regardless of its positive or negative implications for the self and regardless of whether the information affirms or challenges existing self-conceptions; - to servs the function of increasing the certainty with which self-knowledge is held;

Goal	Description
self-enhancement	- pursuing favorable self-knowledge; - to be motivated to elevate the positivity of their self-conceptions; - to protect their self-concepts from negative information; - to be concerned with increasing the positivity or decreasing the negativity of the self (for achieving a high level of self-esteem);
self-verification	- pursuing highly certain self-knowledge; - to be motivated to maintain consistency between their self-conceptions and new self-relevant information; - to provide some measure of perceived control over the world; - social transactions are more predictable (by sharing one's self-conceptions); - to foster a sense of control and predictability in an often-chaotic social environment; - primary concern with authenticating existing (either positive or negative) self-conceptions
self-improvement	- to be motivated to improve own traits, abilities, skills, health status, or well-being;

The self-improvement motive is conceptually different from the other three motives. Whereas self-enhancement is concerned with maximizing the positivity of the self-concept, self-improvement focuses on genuine improvement, which does not necessarily include self-concept positivity. Whereas self-verification is concerned with maintaining consistency between old and new self-relevant information, self-improvement focuses on self-concept change. Finally, whereas self-assessment is concerned with increasing the accuracy of self-knowledge, self-improvement focuses on self-concept betterment regardless of self-concept accuracy. Attempts at self-improvement will result in a sense of progress, growth or hope (Sedikides, Strube, 1997).

The objectives are accomplished through diagnostics tests, the extent to which the questions could discriminate between a train and its alternative. One overriding concern, that self-enhancement motive is relatively the most powerful determinant of the self-evaluation process, followed by self-verification. Still different settings, tasks, prior experience, and personal orientations have to be concerned for detailed justification (Sedikides, 1993).

What is self-assessment? According to Boud, all assessment including self-assessment comprises two main elements: making decisions about the standards of performance expected and then making judgments about the quality of the performance in relation to these standards (Boud, 1995). When self-assessment is introduced, it should ideally involve students in both of these aspects. H. Andrade and Y. Du provides a helpful definition of self-assessment that

focuses on the formative learning that it can promote, considering self-assessment as a process of formative assessment during which respondents reflect on and evaluate the quality of their work and their learning, judge the degree to which they reflect explicitly stated goals or criteria, identify strengths and weaknesses in their work, and revise accordingly (Andrade, Du, 2007).

Why self-assessment is so important? Making judgments about the progress of own learning is integral to the learning process (Spiller, 2012). There are several advantages of self-assessment process in other aspects:

- to build on a natural tendency to check out the progress;

- further improvement is only possible after the recognition of what needs to be learned;

- if it is possible to identify the learning progress, this may motivate for further improvement and development;

- to encourage reflection;

- to promote responsibility and independence;

- to emphasize the formative aspects of assessment;

- to encourage a focus on process;

- to accommodate diversity of readiness, experience and backgrounds (Boud, 1995).

Moreover, by specifying criteria for self-assessment helps to deepen the understanding of what constitutes quality outcomes in a specified area. In the context of current research, the specified area is PCAS.

Additionally, the implementation process needs to include four core elements:

1. a clear rationale: what are the purposes/goal of the particular activity;
2. the explicit procedures, as respondents need to know what is expected of them;
3. reassurance of a safe environment (data protection) to be honest about the opinion;
4. confidence that others will do likewise, and that cheating or collusion will be detected and discouraged (Boud, 1995).

Self-assessment involves AS using the gained information to improve their PCAS, while for quality assurance the data should be compared with any other type of assessment, providing the data about the same criteria and indicators, by from different perspective, therefore the students' assessment of AS is offered.

2.3.2. The Role of Students' Assessment for Academic Staff

The students' assessment of AS provides students with the opportunity to give feedback on the teaching/learning, evaluating the study process and the achievements. This idea is not as since 1982 at the University of Queensland a questionnaire for students to assess the presentation and management of lessons by tutors and lecturers has been used. The introduction and management of the evaluation system should be based on the research on change, considering the updated challenges and trends. Student's evaluations *per se* do not induce change. However, self-assessment focus attention of AS on their own perception as teachers, and possible discrepancies between self and student evaluation may then motivate academic staff to change (Mosis, 1986).

Therefore, self-assessment should be used in the evaluation of teaching/learning within the specified period of time. Overall, there should be relationship between student' assessment and self – assessment of AS. The core question should be how the effectiveness of AS as a university teacher/lecturer is evaluated. Both highly and poorly rated lecturers showed large discrepancies between their self -perception and students' perception. This emphasizes the importance of using more than one source of evaluative information for decision making (Voss, Gruber, 2006).

While planning and organizing the self-assessment and students' assessment several elements have to be considered, the general assessment model is presented on Figure 2.3. The prerequisite competence covers the background of the assessment process, the organization of the assessment process, the application of data and the application of tools are specified in general terms, with some elements being common and other different for each perspective: AS and students (Asadoorian, Batty, 2005) and is related to the previous experience within the current PhD research.

Firstly, the prerequisite competence covers the awareness and ability to develop in a goal-oriented and motivated manner, this mainly corresponds to AS. Secondly, the process of data collection and interpretation, as well as the comparison of both perspectives, should be offered. Thirdly, the application, reflection and discussion of the findings, judgment and final evaluation. Finally, the two types of tools for the two specified perspectives should be developed. According to the PC framework, the study environment has a significant influence on the assessment process and is considered separately (see Figure 2.4).

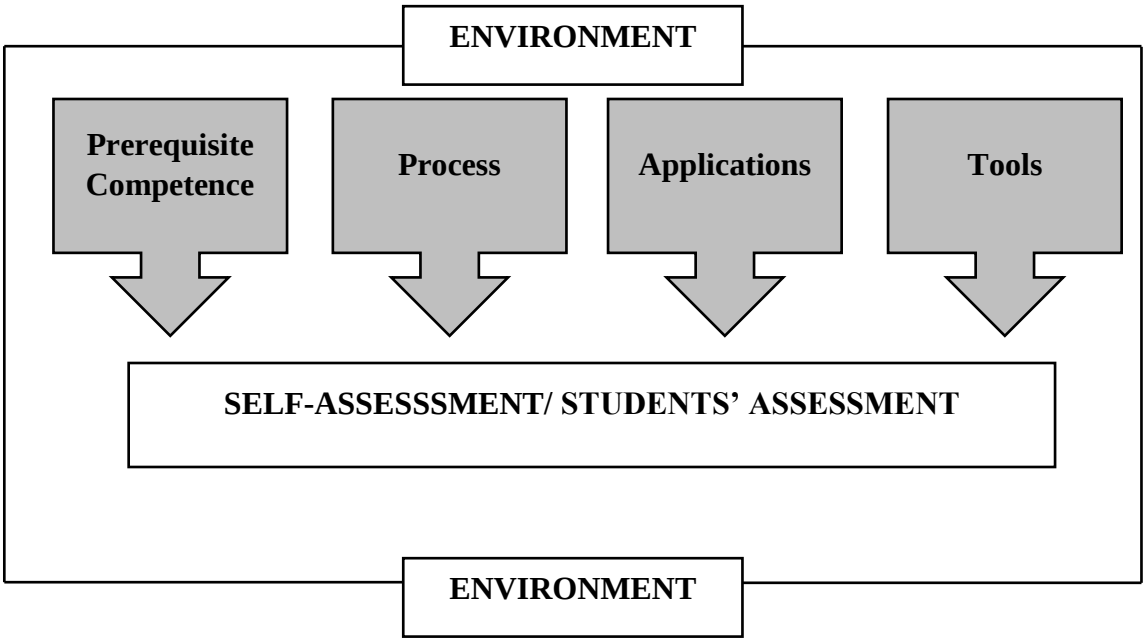


Figure 2.4 **Self-assessment and Students' Assessment** (Asadoorian, Batty, 2005)

It is essential that AS should be well motivated to apply newly acquired knowledge and skills into practice in order to become mastery in the field, training and practice are required, considering the cyclicity nature of the process (see sub-chapter 2.1.).

Through self-assessment and students' assessment, the current situation of PCAS can be analyzed, although this will not provide a clear understanding of the mastery level, another type of evaluation is offered.

2.3.3. Mastery Evaluation for High-level Performance

The mastery level in the context of HEIs corresponds to the quality of teaching and learning, therefore there is a need to provide the definition of quality in the context of the current PhD thesis. Because the term quality has a broad understanding that includes different meanings and refers, for example, to individual performance, achievements and success, the experience gained or the teaching provided. The Quality Assurance Agency, which is responsible for assuring the quality of HE in the UK, defines academic quality as describing how well the learning opportunities available to students help them to achieve their award (Pol, Valeikiene, Hazelkorn, Stan, 2018). Learning opportunities include the provision of teaching, study support, assessment and other aspects and activities that support the learning process. The concept of

quality can be divided into several categories or types, while in the current context the traditional one is used as quality as excellence, academic view which aims to demonstrate high academic standards.

While according to guidelines for implementing innovations in teaching and learning of RSU there is a need for innovative and creative AS who can solve problems in a rapidly changing world, by transforming daily activities in shaping the students' learning experience. The knowledge, creativity and design skills of the students must be at the heart of the process, innovations that are very different from the previously indispensable skills for completing certain tasks and repeating learned actions (Pedagoģiskās izaugsmes centrs RSU, 2022).

However, pedagogical innovations are not limited to the implementation of digital solutions, but focus on meeting the learning needs of students, which can be implemented in both offline and online study environments (The University of Edinburgh, Institute for Academic Development, 2019). The role AS of HEIs to promote knowledge and creativity and to train professionals who both think about the needs of the industry and offer innovative solutions to current problems and are ready to implement them. Therefore, the participation of the students in the development and creation of innovations is also important in the study process, where the students can design themselves and develop their own ideas, and AS participate in and support the implementation of ready-made solutions (Špona, 2022).

Mastery level evaluation is directly linked to the implementation of innovations in teaching/learning and research in technology-enhanced study environment, according to Walder seven concepts that describe innovation of teaching and learning in HE are presented in Table 2.14.

The implementation of innovations for the development of PCAS is an integral part that reflects the mastery level of AS, while the most important to implement them effectively into the teaching and learning in HEIs, by providing the reflective practice and additional experience. As pedagogical innovation is one of the key features to ensure the excellence of teaching and learning and mastery of AS.

Table 2.14

Innovations for Mastery Ensuring of AS (adopted from (Walder, 2014), researcher's concept)

Concept	Description
novelty	the introduction of a new way of learning and teaching in the study process transformation approach vs traditional approach, dealing intensively with the existing situation, finding solutions and planning the course of study
change/transformation	Changes of different forms, covering local and gentle or fast and transformative, but involve adapting to the demands of the study environment of HEI and the current situation in three dimensions: international, European and Latvian
Improvement/ redesign/update	to make the course more understandable, to promote the quality of teaching/learning
reflection	to guide innovative decisions, basing on the study results, providing feedback for both students and AS, covering self-assessment; including already known concepts of AS for effective implementation of effective teaching/learning, reflecting trends and current events in HE
ICT	to examine the possible improvement of teaching/learning through the use of ICT
application/use/ reflective practice	application research and learning about current innovations to improve teaching/learning; to plan and adapt the implementation to the needs of AS and students; to introduce the use of the innovation to students as possible solutions
human aspects/ personal/ individual	of both AS and students; to be ready to take risk and impact of the introduced innovations on the personality of AS and the attitude towards the study process and students

In the context of the current PhD research it is indicated that the traditional approach has been replaced by transformative approach (see sub-chapter 1.4.), while the core pedagogical innovation is reflected by smart education, smart pedagogy and smart didactics (Daniela, 2018;

Uskov et al., 2018; Karkazis, 2019; Meng, Jia, Zhang, 2020), to apply appropriate teaching and learning strategies to promote the development of knowledge, skills and competence in a technology-enriched study environment. While by ensuring the smart pedagogy and smart didactics the term of smart learner is offered, while no concept of smart AS.

So, in addition to self-assessment and students' assessment, the evaluation of mastery level for PCAS has to be conducted. Within the current research the masterful teaching (Ruutmann, Sell, Lohmus, 2018) is the main objective in the PCAS development process, while the continuous development (Novianti, Nurlaelawati, 2019) is required.

Primary conclusions:

Assessment is the systematic background for making interference about teaching and learning process in HEIs by defining, selecting, designing, collecting, analyzing, interpreting, and using data to increase the level of achievements (Rawlusyk, 2018), while the supportive feedbacks are required (Kobayashi et al, 2017), using various assessment tools. When evaluating PCAS the following elements are important: assessors, aspect and assessment forms.

The author believes that for the diversified evaluation of PCAS the qualitative measures: self-assessment, students' assessment and mastery level evaluation should be implemented on regular basis. By drawing parallels between students' assessment and self-assessment the further planning of mastery level evaluation can be offered, in order to explore the achieved level of certain criteria and indicators and considering the findings the continuous development of PCAS is implemented.

The primary tenet of self-assessment is to obtain a mutually accurate evaluation of self, while the process should be motivated in self-diagnostics to reduce uncertainty about an aspect of self (Sedikides, Strube, 1997), to provide clear indication of self -conception in relation to PCAS, to affirm and to question existing self-understanding. In addition, the students' assessment of AS offers students the opportunity to provide feedback on the teaching/learning, to assess the study process, progress and achievements (Asadoorian, Batty, 2005), and then to require the comparative analyses of data, while the criteria and indicators should be common.

As a result of the research, based on the previously summarized conclusions to assess the further improvement of PCAS, considering the specified TDL context and updated trends and challenges in HEIs the following criteria and indicators were specified: firstly, learning and assessment criteria with the following indicators: individual differences of students, personalization; goals and learning outcomes; study course content; teaching methods, models

and strategies; effective study environment; assessment and feedback; reflection; secondly, research-innovative criteria with the indicators of: professional engagement, organizational communication, professional collaboration, reflective practice, continuous self/professional development; and digital criteria with indicators of selection of digital resources; creation and modification of digital resources; management, protection and sharing of digital resources; empowering learners for effective use of digital resources; facilitating learners' digital competence. Since the focus of the current PhD research is on AS with no pedagogical background, the specified assessment criteria and indicators not only help to identify the necessary proportion from the perspective of importance and use, but also the level of mastery in retrospect of further planning of PCAS development and improvement.

While mastery level evaluation is directly linked to the implementation of innovations in teaching/learning and research in technology-enhanced study environment (Pol, Valeikiene, Hazelkorn, Stan, 2018), as this is an integral part that reflects the mastery level of AS, while the most important is to implement them effectively in teaching and learning in HEIs by providing the reflective practice and additional experience. As pedagogical innovation is one of the key features to ensure excellence of teaching and learning and mastery of AS.

Summary

This Chapter focuses on the didactic framework for assessment and development of PCAS in the TDL context, and covers the effective implementation, criteria and indicators for PCAS assessment, considering the three-level approach for descriptors formation.

Firstly, based on the theoretical background and conceptual framework of Chapter 1, the didactic framework for the assessment and development of PCAS is developed with a focus on non-teacher trained AS. The PCAS covers three core criteria: learning and assessment; research – innovative and digital. Meanwhile, the effective study environment combines the best teaching and learning tenets as a permanent concern of the study process in HEIs. The cyclicity nature should be considered as it forms the background for further development perspectives. Moreover, it examines the didactic approaches for implementing the developed PCAS assessment framework and answers the key questions from a pedagogical perspective, since classic didactic questions remain unchanged, while facing new trends and challenges in HE, requiring the corresponding transformations. The main concern is how the progress is reviewed, based on the overview of taxonomies the three-level evaluation approach is specified as the best doctrine to provide a roadmap for the further assessment process in which the new situations and concepts tested and planned on the basis of previous experience, that is a mandatory component of AS who are professionals in the specified field, but with no pedagogical background.

Secondly, based on the developed didactic framework for the assessment and development of PCAS, the theoretically grounded list of indicators was specified to three criteria. The indicators of learning and assessment criterion cover the aspects of personalization, goals, content, methods, effective study environment, assessment, feedback and reflection. While the indicators of research-innovative criterion cover professional engagements, communication, collaboration, reflective practice and self/professional development. Finally, the indicators of digital criterion cover the aspect of digital resources and engagement and facilitating processes. In addition, to provide a clear understanding of mastery level evaluation, the three-level approach adopted from the Universities of Denmark and assignment of competence levels and mastery achievements, following the overview of taxonomies, was followed.

Finally, as assessment is an essential component of teaching and learning and allows to evaluate, judge and improve the specified PCAS, so three forms of assessment are proposed: self-assessment, students' assessment, and mastery level evaluation, systemizing the process by

roles, aspects, assessment forms and context, considering the perspective of AS and students, as based on the findings further continuous self- and professional development of AS can be planned, where the role of HEIs is essential.

Summarizing Chapter 2 of the thesis, it can be concluded that since the focus of current research is on AS with no pedagogical background, the given assessment criteria and indicators will help to not only identify the required proportion from the importance and use perspectives, but also to conduct then the mastery level evaluation to achieve the perspective of further development and improvement of PCAS in HEIs in the TDL context.

Chapter 3 of the PhD thesis provides a detailed overview of the current research design and approbation of the effectiveness of didactic framework for the assessment and development of PCAS in the TDL context.

3. EFFECTIVENESS OF DIDACTIC FRAMEWORK FOR ASSESSMENT AND DEVELOPMENT OF PEDAGOGICAL COMPETENCE OF ACADEMIC STAFF IN TRANSFORMATIVE DIGITAL LEARNING CONTEXT

3.1. Empirical Research: Design, Planning, Background, Sampling and Methodology

Chapter 1 and Chapter 2 provide theoretical and conceptual framework for the formation, structure and implementation of assessment of PCAS, covering the analyses and synthesis of official documents and primary doctrines in three specified dimensions: international, European and Latvian. The research findings show the essence of assessment aspect of PCAS in TDL context in HEIs, didactic principles for the development of PC are formulated, didactical framework for the assessment and development of PCAS is created, while to determine the effectiveness of its implementation in HEIs the criteria and indicators are specified.

Chapter 3 contains an empirical research to generalize, analyze and confirm the primary tenets and core elements for the assessment and development of PCAS, determining the effectiveness of developed didactic framework for the assessment of PCAS in TDL context.

The theoretical background of the research is made by forming the concept of AS in HEIs and the concept of PCAS, by developing the didactic framework for the assessment of PCAS and testing its effectiveness, basing on the specified criteria and indicators. Educational research is the formal, systematic application of the scientific method to the study of educational problems (Gay, Mills, Airasian, 2012). In the context of present PhD this is the assessment process of PCAS, based on the developed didactic framework, determining its effectiveness and specifying the recommendations for its implementation.

Background

The background of the current PhD thesis was formed by Master paper "Digital competence in the context of learning conceptual aspects in higher education institutions" in 2019, reflecting the initial stage of DT in HEIs. Moreover, working as a master-student – researcher in the project "Implementation of Transformative Digital Learning in Doctoral Program of Pedagogical Science in Latvia (DocTDLL) lzp-2018/2-0180, there was an opportunity to be acquainted with the doctrine of transformative learning, while be enlarging its boundaries with the digital aspect, the transformative digital learning in HEIs was highlighted as the research problem.

But in 2020 the Covid-19 pandemics triggered DT in all spheres of life, including HE, therefore the TDL from the novelty became the reality of our lives (see sub-chapter 1.4.), the trends of HE were updated and re-formulated, focusing on non-readiness of both AS and students for such rapid DT, so it was interesting to understand the primary tenets of the process, especially from the perspective of AS, so in the period of time 2020-2021 the detailed analysis of the situation in HE in Latvia was conducted, in order **to re-formulate the theme of the PhD thesis**, facing the new reality, providing rationale for the relevance of the research.

Next step, **the pilot research** was conducted, covering the following stages:

Firstly, **the case study** "Digital Transformative Learning in the Context of Higher Education Following Covid-19 in Latvia" within the project "Implementation of Transformative Digital Learning in Doctoral Program of Pedagogical Science in Latvia (DocTDLL) lzp-2018/2-0180, January-July 2021.

Secondly, **practice at RTA** from December 2021 till January 2022, the comparative analyses of the assessment of AS was conducted to approve the relevance of the research in the perspective of three HEIs: RTA, RTU and TalTech.

Thirdly, **the interview of experts** within Methodological Conference of Riga Technical University, Study Department Center of Academic Excellence, hold in April 2022, to clarify the concept of PCAS among 60 experts of RTU;

Fourthly, **expert work at RTU tenure project**, July 2022 – January 2023, the development of the assessment form for peer observation, peer observation of 6 tenure-track candidates.

Finally**, the case study of RTU,** Human Resources Department, Competence Project of AS, the approval of groups of PCAS.

Basing on the core findings of the pilot research, the details are presented further, and by drawing parallels with the scientifically – theoretical basis the theme of the research was **re-formulated** to the assessment of PCAS in TDL context, and the preliminary design framework was developed.

Research type:

Considering the core paradigms of educational research, two refers to the current one:

- pragmatic, that is problem-centered and action oriented, combining qualitative and quantitative methods, including case study;

- interpretive, that is understanding and meaning-making, also combining qualitative and quantitative methods (Howard , 2013).

By type this is mixed – methods research, where the combination of methods is addressed to the particular phenomenon, in synthesis of quantitative and qualitative data collection, covering the interpretation of studies (Leech, Onwuegbuzie, 2009). While the following foundations should be considered: the conceptualization, the organization of the research, what it comprises and how it is conducted (Cohen, Manion, Morrison, 2018).

The sequence of data collection and interpretation is presented in the research design, as in mixed-methods research it is important to follow the developed route-map.

The research plan is presented in Figure 3.1, where the four stages of the research are specified: research preparation stage and three subsequent stages.

Research Preparation Stage
January 2019 – September 2019

- ✓ the topicality of the current situation has been explored and identified;
- ✓ the experts of the field have been interviewed, concerning the TDL in HE, coding and processing of obtained data;
- ✓ research questions have been proposed;
- ✓ the detailed research design and plan have been developed;
- ✓ the research object, subject and theme have been selected;
- ✓ research questions have been formulated

1st Stage
October 2021 – January 2022

- ✓ the theoretical and scientific literature has been analysed and systemized;
- ✓ research field and problems related to the assessment, development and improvement of PCAS in HEIs have been identified;
- ✓ research methodology has been developed;
- ✓ comparative analyses of new trends and updated challenges in HE following Covid-19 pandemics have been conducted, processing of obtained results;
- ✓ SWOT analyses of Covid-19 impact on HE have been conducted, processing of obtained data;
- ✓ results summary of 1st Stage, analyses

2nd Stage
January 2022– June 2022

- ✓ the scientifically - theoretical bases of the research has been improved;
- ✓ the theoretically grounded didactic framework for the assessment of PCAS has been developed;
- ✓ criteria, indicators and descriptors for the assessment of PCAS have been developed;
- ✓ results summary of 2nd Stage, analyses
- ✓ comparison of the 1st Stage results with the 2nd Stage results

3rd Stage
June 2022 – June 2023

- ✓ the didactical framework for the improvement of PCAS has been approved;
- ✓ processing of research results with SPSS;
- ✓ collection, analyses, interpretation of research results;
- ✓ the efficiency of its implementation has been determined;
- ✓ the recommendations for the implementation of TDL in HEIs have been specified;
- ✓ thesis defence

Figure 3.1 **Research Plan**

Following the research plan, the research design was developed, drawing up the strategy organizing the research and making it practicable, so that research questions can be answered based on evidence and warrants and purposes are addressed (Cohen, Manion, Morrison, 2018). The current research design, the route map is presented in Figure 3.2.

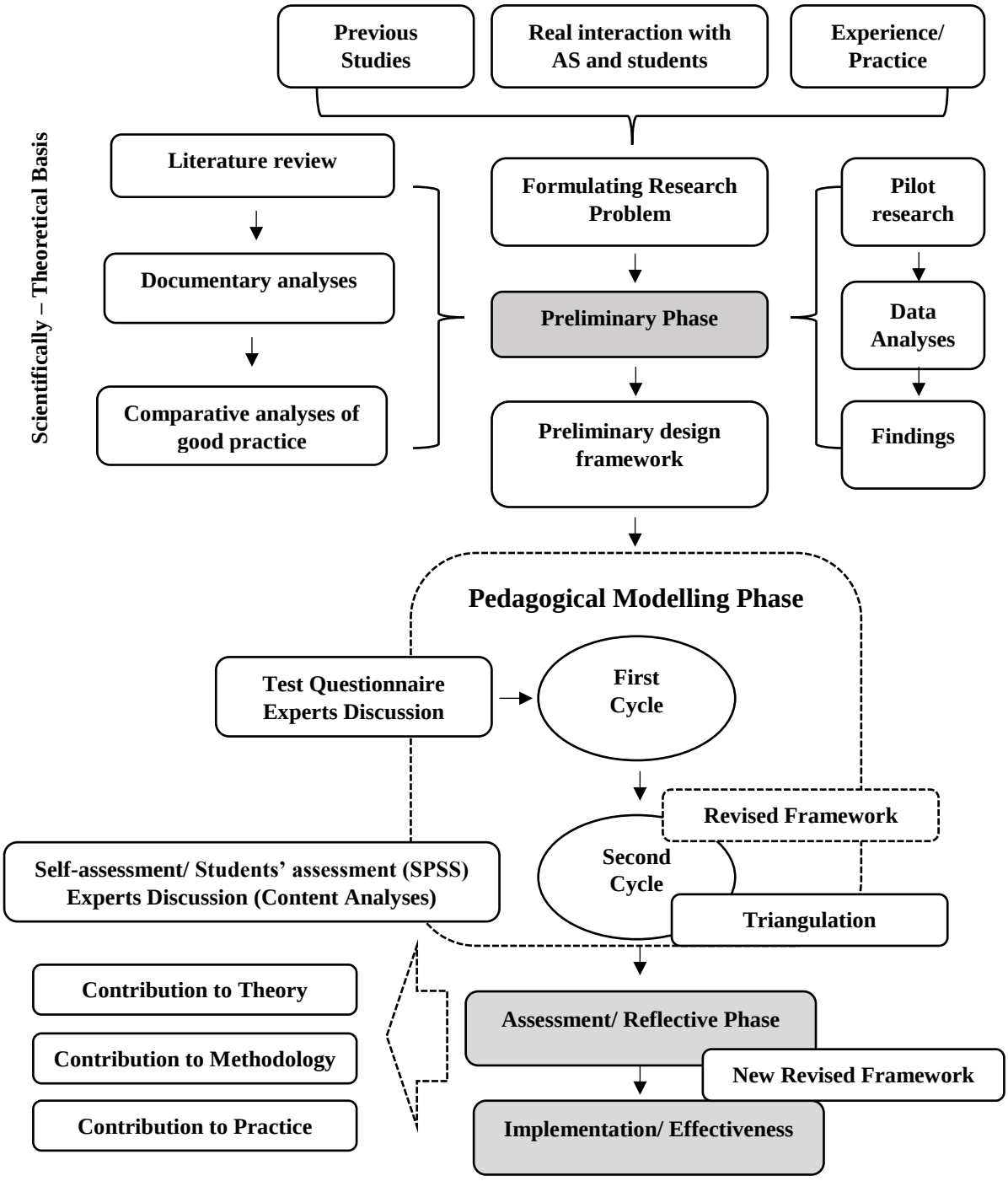


Figure 3.2 **Research Design**

Research Sample:

The sampling of the current research is made of AS and students of three HEIs: Rezekne Academy of Technologies, Riga Technical University and Tallinn University of Technology – total 87 respondents, including 62 students and 25 representatives of academic staff.

TalTech was selected as the research sample as T. Ruutmann, the professor of this university introduced the concept of Engineering pedagogy at RTU Methodological conference, emphasizing the tenure track offer as a motivating and attracting factor for AS, following the specially developed assessment system, already implemented at their university. Therefore, their experience was suggested as valuable for knowledge transfer and good practice gaining.

The effectiveness of the developed framework was tested within **RTU ERASMUS+ project** Transformative Digital Pedagogies for Higher Education TDP4HE (Nr. 2022-1-LV01-KA220-HED-000085277) in September 2022. Ten experts from **Cyprus, Rumania, France, Ireland and Latvia** took part in the questionnaire and discussion, reflecting the ideas of both perspectives: students and AS.

By analyzing the results, the respondents were divided by the following categories: gender, age, country, HEI, occupation and the study field. To ensure the triangulation of data, a comparative analysis was carried out in the context of three HEIs: RTU, RTA and TalTech.

Methodology

The emphasis of current research is put on the design-based methodology, as according to Kennedy-Clark such platform can provide a high-level research, ensuring a range of data acquisition, methods and analyses by achieving deeper understanding of the formulated research problem (Kennedy-Clark, 2013).

Moreover, three-stage design-based research model (Goff, Getenet, 2017) is used, additionally offering the preparation stage. The idea that particular context, nature, aim and tasks of individual research inquiries are unique in the offered model, that means the empirical research is grounded into the scientifically – theoretical basis. Moreover, moving sequentially through the stages, the deeper understanding of the defined problem is developed.

While, there are several ways to come to the desired outcome:

- through own experience, one of the fundamental ways, or experience of others;
- through thinking and through reasoning, where to the process of using logical thought to reach a conclusion is used (Gay, Mills, Airasian, 2012).

The interconnection of the core methodology of the current research, considering the theory and practice, is presented in the research design (see Figure 3.2), where the findings and achievements of pilot research, real interaction with AS and students and the experience and practice of self and others are summarized.

First, the analyses of literature, analyses of documentary and strategic documents as well as comparative analyses of good practice examples were conducted.

Second, the comparative analyses of the assessment aspect of PCAS in HE were conducted in three dimensions: international, considering Canadian perspective; European, considering the perspectives of Ireland, Denmark, the UK, Estonia, and Lithuania; and Latvian one. At the same time, the pilot research was conducted, covering three above-mentioned study and research, to systemize the findings the experts' discussion was organized.

Since the empirical distribution of all variables is not normal, the non-parametric statistics methods were used, without probability basis, as there are no assumptions about the population, as numerical parameters are unknown (Cohen, Manion, Morrison, 2018).

Data collection and processing methods of the empirical research are presented in Figure 23. The following methods and tests were used to process, analyse and compare the obtained data through SPSS:

- Likert scale of psychometric research was used (Likert, 1932) as the basis for the analysis of the answers, using 1- 5 interval format, where: in Importance aspect (1 – not important; 2 – slightly important; 3 – moderately important; 4 – important; 5 – very important); in Readiness (use/apply) aspect (1 – never; 2 – ever; 3 – sometimes; 4 – often; 5 – always).

- Arithmetic mean is one of the most common indices of general tendency, which is calculated by dividing the sum of all values by the total number of values (Mārtinsone, Pipere, Kamerāde, 2016).

- the reliability and validity of the scale was checked using Cronbach's alpha coefficient. According to Cronbach's explanations, this index reflects the consistency of internal characteristics that describe one object, but does not indicate the homogeneity of the object (Cronbach, 1951). Several researchers agree that this is the most popular coefficient to test the reliability of a scale, because it is easy to interpret (Taber, 2018).

- Mann-Whitney U Test, that is non-parametric test, whether two samples are likely to derive from the same population (Cohen, Manion, Morrison, 2018). This test was used to

compare differences between two independent groups: AS and students; and two countries: Latvian perspective and Estonian perspective.

- Kruskal-Wallis H Test is a rank-based nonparametric test to determine whether samples are originated from the same distribution (Cohen, Manion, Morrison, 2018). To test the differences from several perspectives: AS and students.

- Kolmogorov-Smirnov Test, to determine the difference between the offered statements, total 17, from different perspectives, considering the distribution.

Additionally, the content analyses method was used for qualitative data analyses. The main goal of qualitative data analysis is to find out how a person subjectively constructs the reality or certain situation regarding the specified subject of cognition, based on his statements answering open-ended questions, where the meaning of statements is revealed (Kroplijs, Raščevska, 2010). The quantitative data was approved by NVivo software.

Findings/Achievements

The validity of research was improved by using as qualitative as quantitative data, obtained through self-assessment questionnaire, students' assessment questionnaire, interview of experts and peer observation, forming mixed-methods research by ensuring the synthesis of findings for broad understanding of the formulated research problem. So, the current PhD research provided the answers to the formulated questions of the research:

1. What didactic principles characterize the possibility of introducing the assessment of pedagogical competence of academic staff in transformative digital learning context in higher education institutions?

2. What needs of target group stipulate the creation of didactic framework for the assessment and development of pedagogical competence of academic staff?

3. In what way the implementation of developed didactic framework provides the effectiveness of transformative digital learning in higher education institutions?

3.2. Data Processing, Analysis for Assessment of Pedagogical Competence of Academic Staff in Higher Education Institutions

3.2.1 Findings of Pilot Research for the Formation of Pedagogical Competence of Academic Staff in TDL context

The stages of pilot research are listed in 3.1. sub-chapter under the background of the research and the key findings for the formation of PCAS were specified. In order to identify the current situation in HEIs, following Covid-19 pandemics the case study "Digital Transformative Learning in the Context of Higher Education Following Covid-19 in Latvia" within the project "Implementation of Transformative Digital Learning in Doctoral Program of Pedagogical Science in Latvia (DocTDLL) lzp-2018/2-0180, was conducted in January-July 2021.

As ICT have transformed the study process of HEIs by providing new challenges and updating trends, triggering DT (see sub-chapter 1.4.), so there was a need to analyze the general situation in HE of Latvia, focusing on the four core aspects: the study environment, organization of the study process, competence and IT-Human dialogue. The analyzes were conducted from two perspectives: from importance and from readiness. The survey method was used as it has several important advantages: firstly, this is a method of collecting preliminary information, which involves asking the group of respondents oral or written questions that container the research problem at an empirical level, as well as statistically processing the obtained answers afterwards (Kristapsone, 2014), secondly, a questionnaire is a written survey procedure using pre-prepared forms filled in by representatives (Seibert, 2012), finally, according to E. Babbie the following elements of the survey method are distinguished: the researcher, who created the offered survey tool; the interviewer, respondents; the questionnaire plan, structure; social, economic and psychological reality, the environment (Babbie, 2014).

93 respondents from HEIs of Latvia took part in online survey, including 23 AS and 67 students, respondents had been from 18 to 62, while the majority of 31 respondent had been in age range 18-25, presenting three fields: engineering, social studies and humanities. Respondents showed their level of agreement or disagreement using a Likert scale for tow indices: Importance and Readiness. Considerable difference between importance index and readiness index was observed, as neither AS not students were not ready for such rapid DT (see Appendix 19). In addition, by comparing the open-question about the total satisfaction, only 19% of respondents were more or less satisfied with DT process and consequence. The findings of the study were presented in the project monograph Transformative Digital Learning:

Emerging Cases and Considerations, Chapter 3: Case study of Latvia and is available online http://books.rta.lv/index.php/RTA/catalog/view/23/28/92-3.

As the mentioned study covered the general aspect of pedagogical process in HE, while to emphasize the perspective of AS, the interview of experts was organized in April 2022 within the Methodological Conference of Riga Technical University, organized by RTU Study Department Center of Academic Excellence. The theme of the conference has been the Enhancement of Pedagogical Competence of Academic Staff: Content, Methods, Experience. Sixty representatives of RTU AS took part in the conference, additionally providing the comments and suggestions concerning two key aspects:

- the core elements for the assessment of PCAS;
- how to make the assessment process more effective and value-added.

The content analyses method was used for data analyses, this is a research method by means of which conclusions can be obtained on the basis of any type of data, by systematically and objectively analyzing the meaning of its constituent elements, usually the obtained conclusions extend beyond the specific content of the particular data under analyses. Moreover, deductive approach was used applying the clear assumptions in the way of three perspectives: I. AS Perspective; II. Students' Perspective; III. Institutional Perspective.

Following content-based approach, firstly, the answers were specified as content units, showing the particular context. Afterwards, the categories were scientifically expressed. Lastly, the concepts, scientific and applicable to the research theories were specified (see Appendix 20). By summarizing the content units, the categories and concepts are shown, covering the above-specified perspectives, forming the triangulation of research:

- in institutional perspective: the need of clear assessment system and index of PCAS;
- in perspective of AS: the aspect of teaching/learning, personalization aspect, experience, field knowledge, self/professional development, digital skills, empathy;
- in perspective of students: the need of assessment, feedback reflection and attitude aspect.

As a result, the role of clear index of PCAS was emphasized from institutional perspective, that is necessary for assessment conducting. Moreover, the personalization, self and professional development, teaching/learning and field knowledge concepts are listed from AS perspective. While, from students' perspective, attitude, assessment, feedback and reflection concepts were specified. It is important to consider the specified concepts for effective assessment of PCAS in

HEIs, including the assessment strategy and indices system as well as continuous self/professional development aspect.

Besides this, the Competence Study for AS was conducted in RTU in October 2022 by Human resources department, where several groups of competence were specified, while in the context of current PhD research the detailed analyses were conducted for two indicated aspects: the use of knowledge, skills and ICT and learning/teaching and research. Total 219 respondents from RTU AS took parts in the study.

The mentioned research summarized the opinion of AS only, respondents showed their level of agreement or disagreement using a Likert scale (from 1 to 5) for each indicated statement from two aspects: evaluating the aspect in own work; evaluating the aspect in the work of others. The data is presented in Appendix 21.

By summarizing the answers on three offered statements for "the use of knowledge, skills and ICT" the most important is – "the use of professional knowledge in own field of activities" (4,77); than – "ICT use to increase the effectiveness" (4,69); and finally, "the improvement of professional knowledge and skills" (4,67). In addition, from the aspect of "teaching/learning and research", the total results were lower in comparison with "the use of knowledge, skills and ICT", while the most important was "to be quick on the uptake (quick perception and reaction)" (4,56), while the total of "broad research of information" was considerably low only 4,44.

Thus, as the average total is considerable high, the teaching/learning, research and its direct connection with the use of ICT is once again confirmed, proving the relevance of the formulated problem.

So, without a clear strategy of HEIs, it is not possible to implement the assessment of AS on a regular basis, additionally providing the transparent and clear explanations about the required outcomes, developing the assessment system with criteria and indicators, basing on the feedback and reflection, the further development planning should be conducted, ensuring the improvement of mastery level as for teaching/learning and research, as for the effective use of ICT.

Moreover, three HEIs were analyzed: Rezekne Academy of technologies (Appendix 22), Riga Technical (Appendix 23), and Tallinn University of Technology (Appendix 24) for the current questionnaires used. Same criteria and indicators were specified to check the presence of them, see the comparative matrix (Table 3.1).

Table 3.1

Comparative Matrix of Questionnaires Used in RTA, RTU, TalTech

(created by researcher)

Criteria/Indicator	RTA	RTU	TalTech
I. Teaching/Learning and Assessment			
1.1. Individual differences of students, personalization	-	-	-
1.2. Goals and learning outcomes	-	-	✓
1.3. Study course content	✓	-	✓
1.4. Teaching methods, models and strategies	-	-	✓
1.5. Study environment	-	-	✓
1.6. Assessment and feedback	✓	✓	✓
1.7. Reflection	-	-	✓
II. Research – innovative			
2.1. Professional engagements	-	✓	✓
2.2. Organizational communication	-	✓	✓
2.3. Professional collaboration	-	✓	✓
2.4. Reflective practice	✓	✓	✓
2.5. Continuous self/professional development	✓	✓	✓
III. Digital			
3.1. Selection of digital resources	-	-	-
3.2. Creation and modification of digital resources	-	-	-
3.3. Management, protection and sharing of digital resources	-	-	-
3.4. Empowering learners for effective use of ICT	-	-	-
3.5. Facilitating learner's digital competence	-	-	-

According to Table 3.1 it can be concluded that in comparison with TalTech, additional criteria and indicators should be added to the assessment questionnaire of RTA and RTU, concerning teaching, learning and assessment, while the digital aspect should be additionally specified for all three HEIs.

Within the work in RTU tenure project the assessment form for the evaluation of an open lecturer of candidates was developed (see Appendix 25), similar criteria and indicators were specified from teaching, learning and assessment group. Peer observation was used for six candidates.

Peer observation of teaching/learning is an opportunity for observers and observees to mutually enhance teaching/learning practice, opening up dialogue and discussion through shared practice and solving of problems in teaching contexts. This form acts as a catalyst for

conversation around teaching/learning practice (Bell, Cooper, 2011), to encourage AS to reflect on the effectiveness of their teaching and learning regimes (O'Keeffe et al., 2021) and to inform their professional development (HEA, LTEU, 2013). It is important to indicate that peer observation is voluntary, confidential, and bidirectional, it is a formative professional development tool reliant on the participants voluntarily engaging in the process with the explicit purpose of advancing their professional practice (O'Riordan, Buckley, Lincoln, 2021).

The results were directly compared with the criteria and indicators of the offered didactic framework. The core difference has been observed in the definition of goals and outcomes, as 50% of the candidates highlighted the goals and the outcomes of the research they were speaking about not specifying the goals and outcomes of the relevant lecturer. None of them considered the personalization aspect, while it has been an open lecturer. Moreover, no assessment, feedback or reflection provided, just giving an opportunity to ask the questions about the explained research field.

While the most intriguing finding is that the research-innovative aspect was considered, as the results presented reflected the research-based approach and updated innovation in the discipline related field, additionally the digital aspect for data analyses was specified.

That proved the focus of the current research, that non-teacher trained AS are professionals of the related field, while the teaching/learning aspect should be improved, that is the core group of PCAS.

Summing up the findings of pilot research, it was concluded that the concept of PCAS should be clearly specified and the system of criteria and indicators should be developed for the assessment process, where the didactic (teaching/learning) background is the core group.

3.2.2. Effectiveness of Didactic Framework for the Assessment of Pedagogical Competence of Academic Staff

In order to approve the effectiveness of the developed didactic framework for the assessment of PCAS the Delphi method was used (see Figure 3.3).

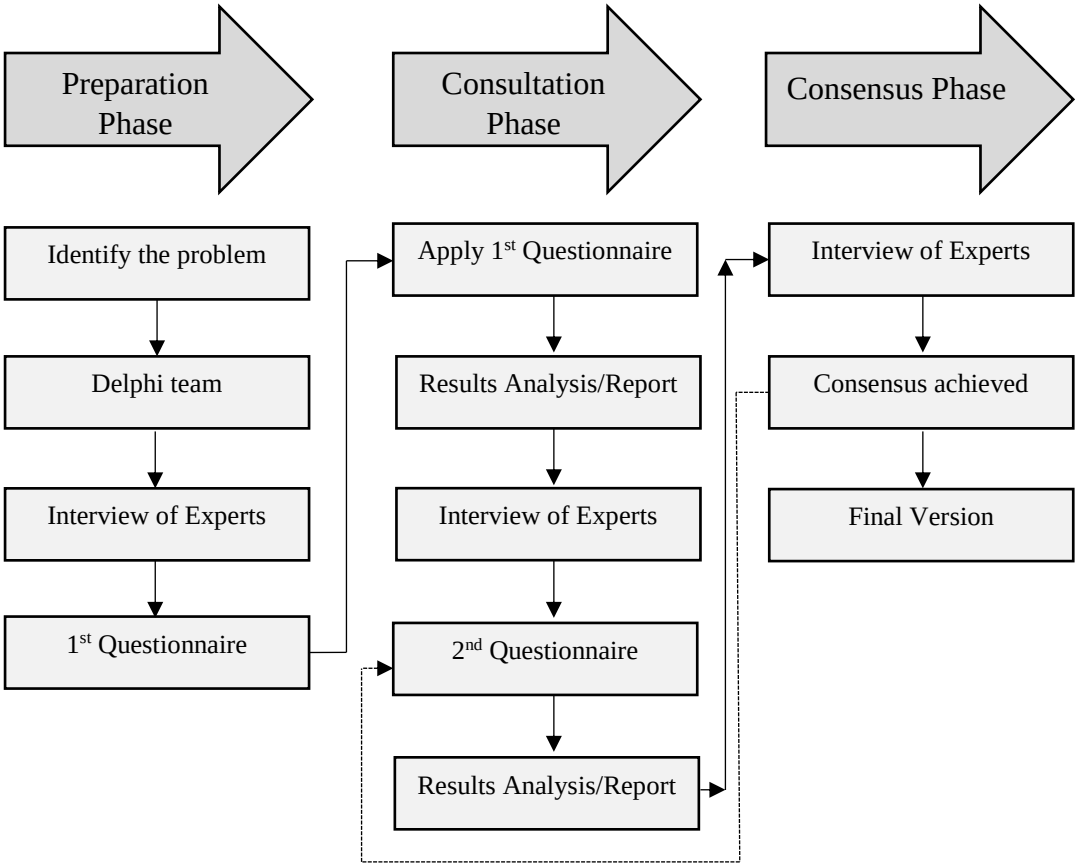


Figure 3.3 **Delphi Method Design for Current Research** (developed by researcher)

The Delphi method was used to plan the interview of experts in order to approve the specified criteria and indicators of PCAS. The Delphi method is an iterative process to collect and distill the anonymous judgments of experts using a series of data collection and analysis techniques interspersed with feedback, it is well suited as a research tool when there is incomplete knowledge about a problem or phenomenon, especially to improve the understanding of problems, opportunities, solutions, using mainly quantitative techniques (Skulmoski, Hartman, Krahn, 2007). The design of Delphi method is shown in Fig. 3.3.

The Delphi Method has been used starting from the Pilot research, where the relevance of the problem was defined through the case study and the interview of experts at RTU conference,

forming the 1st Questionnaire, then the 1st Questionnaire has been applied as TEST questionnaire, after the analyses of the results the next interview of experts was organized, where 10 experts from technical HEIs took part to provide the judgment and the guidelines for the improvements, then 2nd Questionnaire (the improved one) was offered to check the effectiveness, the next interview of experts was conducted to update the didactic framework (shown in Fig.2.1) and the improved didactic framework was developed. Further, the data analyses are presented, considering the data of TEST questionnaire and the final one.

Firstly, the distribution of respondents by occupation was conducted: the majority of respondents are Bachelor students 60% (52), while AS forms 29% (25) from the total, including professors (9), associated professors (6), docents (1) and lecturers (9), the rest was formed by master students (6) and PhD students (4).

This is case study research, so the respondents who participated in piloting are not the same as those participated in the final questionnaire. Moreover, the focus of the current research is on non-teacher trained AS, so the majority of respondents were from engineering field 71% (62) and social sciences 29% (25).

By study field, the relative frequency of respondents is as follows: 15 (17%) respondents of AS are from engineering and 10 (12%) respondents of AS are from social sciences (mainly economics); while 47 (54%) respondents of students are from engineering and 15 (17%) respondents of students are from social sciences (mainly economics and management).

By gender, the almost equal distribution of respondents was observed: 43 (49%) male and 44 (51%) female, while the proportion is different in the perspective of AS – more female (16 (18%)) than male (9 (10%)), while among students – more male (35 (40%)) than female (27 (32%)).

By age, the distribution was directly linked to the occupation, as more students of bachelor program took part in the questionnaire, so the age group 18-24 is the most presented – 44 (50%), 25-34 – 2 (2%) AS and 8 (9%) students; 35-44 – 8 (9%) AS and 8 (9%) students; 45-54 – 13(15%) AS and 3 (4%) students and 55-64 only 2 (2%) AS.

For data triangulation the distribution of respondents by HEIs was specified:

- Riga Technical University – 41 (47%), including 11 (12%) AS and 30 (35%) students;
- Rezekne Academy of Technologies – 32 (37%), including 10 (12%) AS and 22 (25%) students;

- Tallinn University of Technology – 14 (16%), including 4 (4%) AS and 10 (12%) students.

The interesting aspect was observed by generalizing the distribution by country: Latvia, considering data of Riga Technical University and Rezekne Academy of Technology and Estonia, considering data of Tallinn University of Technology. Moreover, four foreign students filled in the questionnaire on behalf of RTU, as at the moment they are RTU students, while their country of origin is Turkey (1 student), Vietnam (1 student), Albania (1 student) and Iran (1 student).

Secondly, according to the developed didactic framework for the assessment of PCAS in TDL context, the three core criteria were highlighted: learning and assessment, research-innovative and digital, specifying several indicators for each criterion (see sub-chapter 2.2.). So, the effectiveness of the developed framework was tested within RTU ERASMUS+ project Transformative Digital Pedagogies for Higher Education TDP4HE (Nr. 2022-1-LV01-KA220-HED-000085277) in September 2022. Ten experts from Cyprus, Rumania, France, Ireland and Latvia took part in the questionnaire and discussion, reflecting the ideas of both perspectives: students and AS. The three criteria were tested from importance and readiness aspects, using a Likert scale from 1 (less) to 5 (the most) to show the agreement or disagreement.

Then, the discussion of experts was organized, to identify the benefits and drawbacks of the offered didactic framework for the assessment of PCAS. Despite the fact, that expertise in pedagogy is cumulative and informative, and focused on small numbers of individuals, still it is valuable for providing additional arguments and opinions, by enlarging and re-defining the specified one (Berliner, 2001).

Summing up the core finding from the interview of experts the following common pattern were highlighted:

- I Criterion should be re-formulated from Learning and Assessment to Teaching/Learning and Assessment;

- the study environment indicator should be added to I. Criteria;

- the number of indicators of II Research-innovative Criterion and III Digital Criterion should be revised afterwards as the emphasis of the offered questionnaire is on the PC of non-teacher trained AS, empathising I Criterion of Learning and Assessment;

- there should be different formulation of the same criteria and indicators from the perspective of AS for self-assessment; and from students' perspective to assess the implementation of the specified indicators in the work and activities of AS.

The didactic framework for the assessment of PCAS was accordingly improved.

In the period of time form December to January 2022, an online questionnaire was conducted in three HEIs: Riga Technical university, Rezekne Academy of Technologies and Tallinn University of Technology, considering the focus of the current PhD research on non-teacher trained academic staff.

The main task of the PhD research was to approve the effectiveness of didactic framework for the assessment of PCAS, so two perspectives were considered:

- perspective of AS by conducting the self-assessment in importance and readiness aspect;
- perspective of students by conducting the students' assessment of apply/use aspect.

Total three criteria were offered, covering 17 indicators.

To check the reliability, Cronbach's alpha was used.

$\alpha = N * r / (1 + r (N-1))$, where

N – the number of studied components,

r – average correlation between components.

N = 17 in the conducted research, using Cronbach's alpha the internal consistency is evaluated as following:

$\alpha \geq 0.9$ – excellent (high-stakes testing);

$0.7 \leq \alpha < 0.9$ – good (low-stake testing);

$0.6 \leq \alpha < 0.7$ – acceptable

$0.5 \leq \alpha < 0.6$ – poor

$\alpha < 0.5$ – unacceptable.

In the particular research, $\alpha = .952$. This means excellent reliability and consistency of internal characteristics.

Moving in depth of the analyses, the arithmetic mean was calculated to each specified criteria and indicator. Firstly, the parallels with the results of TEST questionnaire were drawn, using mean. The average index (Mean) of all three criteria was specified as for importance as for readiness (see Appendix 26).

The experts during TEST questionnaire highly evaluated the importance of all three criteria, while in the self-assessment of AS the average importance indices had considerable

difference with TEST. While, for readiness aspect the data were very similar, that foreground the necessity of further improvement planning and implementation.

The final results were obtained in December 2022 – January 2023. 87 respondents of three HEIs filled in the online questionnaire: 25 AS and 62 students. It is important to indicate that two different questionnaires were developed, as the assessment concept differed from the perspective of AS and students. By conducting the self-assessment of PC two aspects were offered to AS: importance and readiness/apply, while for the students' assessment only the apply/use aspect was highlighted.

As the main task of the current PhD thesis is to determine the effectiveness of the developed didactic framework for the assessment of PCAS, focusing on non-teacher trained AS. So, next, the analyses of each criteria and indicator were summarized.

According to the developed didactic framework three criteria were specified, covering 17 indicators. The replies of respondents to the indicators of **I Learning and Assessment Criterion** are presented in Figure 3.4. The majority of respondents approve the often or always apply and use of core elements of teaching and learning, considering indicators: 1.2. goals and learning outcomes (74%), 1.3. study course content (81%), 1.4. study environment (72%), 1.6. assessment and feedback (72). The averages are for 1.5. teaching methods, models and strategies (67%). But more attention should be paid to 1.1. individual differences of students, personalization (only 44%) and reflection (49%).

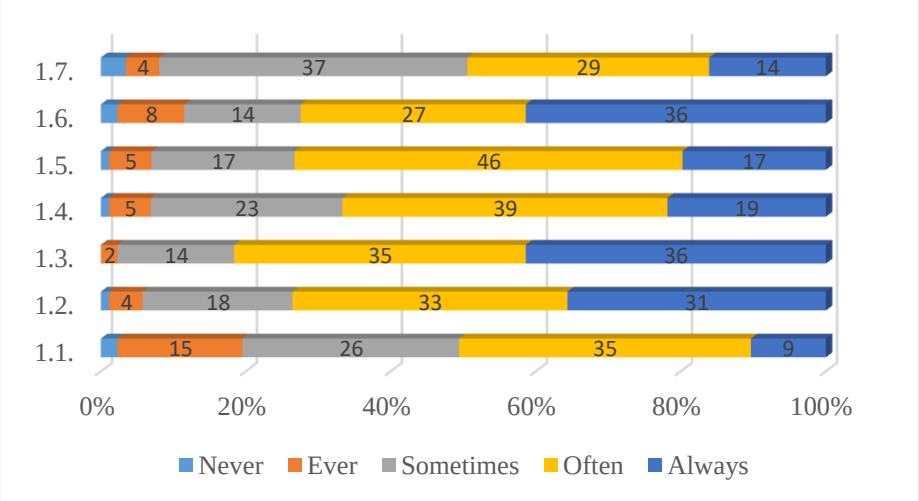


Figure 3.4 **Indicators of I Learning and Assessment Criterion**

By calculating the frequency mean for indicators of I Criterion from both perspective of AS and students, the results are presented in Table 3.2.

Table 3.2

Use/Apply Index for I Criterion from Both Perspectives

Criteria/Indicator	**Use/Apply Index AS** Mean	**Use/Apply Index Students** Mean	**Difference**
I Learning and Assessment	4,07	3,69	0,38
1.1. Individual differences of students, personalization	3,56	3,30	0,26
1.2. Goals and learning outcomes	4,36	3,86	0,50
1.3. Study course content	4,56	4,06	0,50
1.4. Teaching methods, models and strategies	4,00	3,69	0,31
1.5. Study environment	4,12	3,68	0,44
1.6. Assessment and feedback	4,32	3,80	0,52
1.7. Reflection	3,56	3,46	0,10

According to the results of frequency test the highest apply level from the perspective of AS is for the following indicators: study course content, goals and learning outcomes and assessment and feedback. While, from the perspective of students, overall rates are lower, while the highest apply level is observed for the following indicators: study course content, goals and learning outcomes and assessment and feedback. By comparing the two offered perspectives, none equal answers are observed, there is difference between each indicator of I Criterion from both perspective of AS and students.

According to the scientifically-theoretical basis of the research, the proportion of II Research-innovative Criterion and III Digital Criterion is offered less in comparison with I Learning and Assessment Criterion, so the comparative analyses were conducted. The replies of respondents to the indicators of II Research-Innovative Criterion are presented in Figure 3.5.

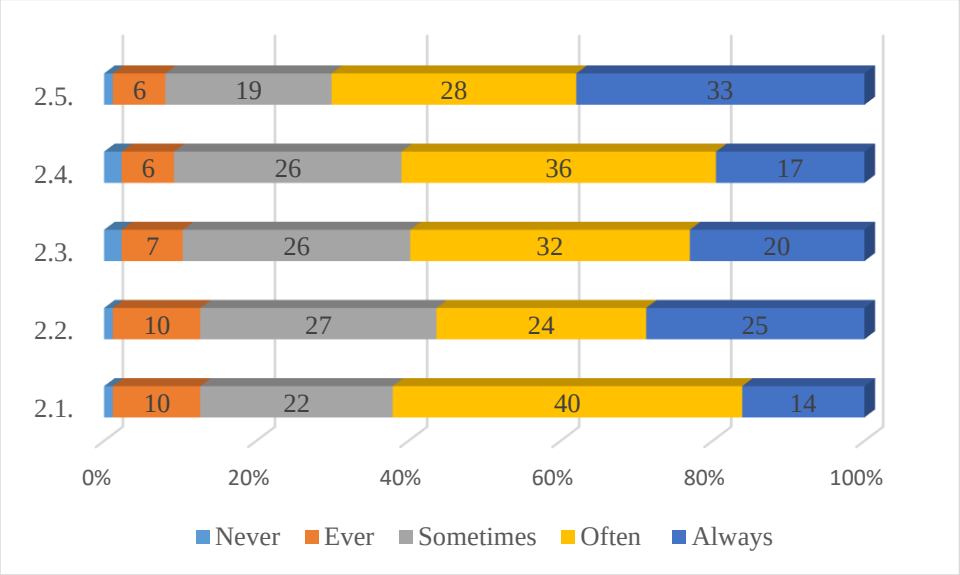


Figure 3.5 **Indicators of II Research-Innovative Criterion**

According to Figure 3.5 the highest level of apply/use is observed for one indicator - 2.5. continuous self and professional development. While similar level of use is observed for four other indicators: 2.1. professional engagement (62%), 2.2. organizational communication (57%), 2.3. professional collaboration (60%) and 2.4. reflective practice (61%). By drawing parallels of frequency mean for indicators of II Criterion, in the specified perspectives: as AS (4,36), as students (3,82) highly evaluated the indicator 2.5. continuous self and professional development. Additionally, the highest value is observed for the same 2.5. indicator among students and AS between five indicators of II Research-Innovative Criterion. Therefore, continuous self and professional development should be considered for academic staff on mandatory bases.

Table 3.3

Use/Apply Index for II Criterion from Both Perspectives

Criteria/Indicator	**Use/Apply Index AS** Mean	**Use/Apply Index Students** Mean	**Difference**
II Research – innovative	3,93	3,66	0,27
2.1. Professional engagements	3,68	3,62	0,06
2.2. Organizational communication	3,96	3,60	0,36
2.3. Professional collaboration	3,92	3,62	0,30
2.4. Reflective practice	3,72	3,62	0,10
2.5. Continuous self/professional development	4,36	3,82	0,54

The frequency means for I Learning and Assessment Criterion in total are higher than frequency means for II Research-innovative Criterion, as for AS (4,07 to 3,93), as for students (3,69 to 3,66), while the difference from the perspective of AS is clearer.

According to sub-Chapter 1.4. TDL context was specified for the current PhD research, therefore III Digital Criterion was specified. The findings are shown on Figure 3.6.

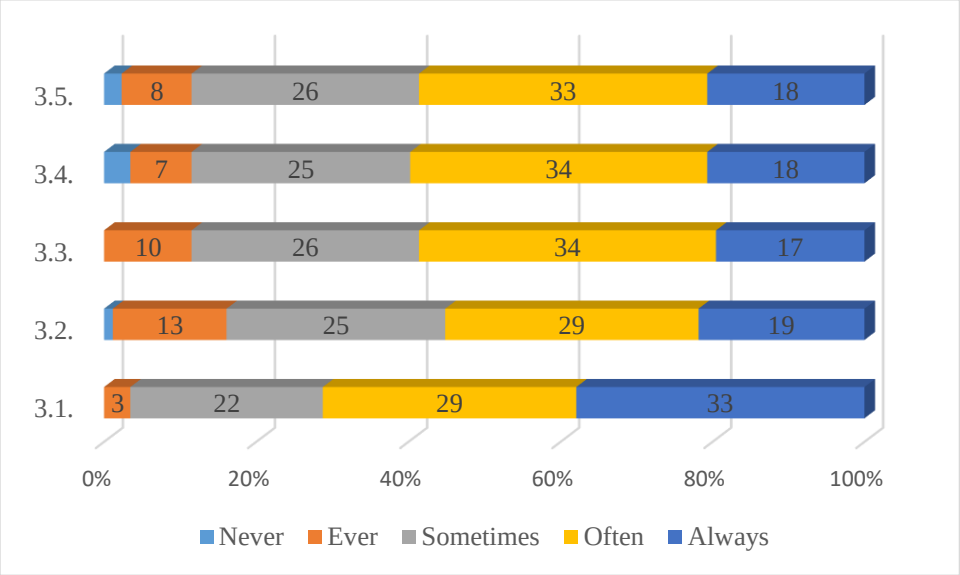


Figure 3.6 **Indicators of III Digital Criterion**

Summarizing the results, the considerable difference is observed for indicator - 3.1. selection of digital resources. While, the similar values are observed for three indicators: 3.3. management, protection and sharing of digital resources (59%); 3.4. empowering learners for effective use of ICT (60%) and 3.5. facilitating learner's digital competence (59%). The lowest value is for indicator 3.2. creation and modification of digital resources (55%).

By generalizing the frequency means for III Digital Criterion the data are presented in Table 3.4. The special situation is observed in the difference value between AS and students, where the negative values appeared.

Table 3.4

Use/Apply Index for III Criterion from Both Perspectives

Criteria/Indicator	**Use/Apply Index AS** Mean	**Use/Apply Index Students** Mean	**Difference**
III Digital	3,91	3,63	0,28
3.1. Selection of digital resources	4,24	3,97	0,27
3.2. Creation and modification of digital resources	3,52	3,60	-0,08
3.3. Management, protection and sharing of digital resources	3,64	3,66	-0,02
3.4. Empowering learners for effective use of ICT	4,08	3,48	0,60
3.5. Facilitating learner's digital competence	4,08	3,46	0,62

That means, AS had evaluated the apply and use of two indicators (3.2. creation and modification of digital resources and 3.3. management, protection and sharing of digital resources) higher than the students. The highest frequency mean is observed for 3.1. selection of digital resources as for AS (4,24), as for students (3,97), while for AS the value is considerable higher. The frequency means for III Digital Criterion is similar to II Research-innovative Criterion for AS (3,91 to 3,93), while considerably lower to I Learning and Assessment Criterion (3,91 to 4,07). The values of frequency mean of students are slightly similar to all three Criteria (3,69 to 3,66 to 3,63).

For the detailed grounding the comparative analyses of two indices: Importance and Readiness were conducted from the perspective of AS, to highlight the considerable differences, reasoning the total values, see Table 3.5.

Despite the usual distribution, when the Importance Index is higher than the Readiness Index, for some indicators a non-standard pattern was observed: 1.6. assessment and feedback (- 0,36); 2.3. professional collaboration (- 0,16) and 3.2. creation and modification of digital resources (0). Although, for all other statement Importance Index was higher than Readiness Index, the highest difference was observed for indicators, concerning the learners' aspect: 3.5. facilitating learner's digital competence (0,76); 3.4. empowering learners for effective use of ICT (0,52) and 1.1. individual differences of students, personalization (0,48).

Table 3.5

The Perspective of Academic Staff of Importance/Readiness

Criteria/Indicator	**Importance Index** Mean	**Readiness Index (Use/Apply)** Mean	**Difference**
I Learning and Assessment Criterion	4,22	4,07	0,15
1.1. Individual differences of students, personalization	4,04	3,56	0,48
1.2. Goals and learning outcomes	4,40	4,36	0,04
1.3. Study course content	4,60	4,56	0,04
1.4. Teaching methods, models and strategies	4,32	4,00	0,32
1.5. Study environment	4,36	4,12	0,24
1.6. Assessment and feedback	3,96	4,32	-0,36
1.7. Reflection	3,88	3,56	0,32
II Research – innovative Criterion	4,06	3,93	0,13
2.1. Professional engagements	3,80	3,68	0,12
2.2. Organizational communication	4,00	3,96	0,04
2.3. Professional collaboration	3,76	3,92	-0,16
2.4. Reflective practice	4,08	3,72	0,36
2.5. Continuous self/professional development	4,64	4,36	0,28
III Digital Criterion	4,20	3,91	0,29
3.1. Selection of digital resources	4,56	4,24	0,32
3.2. Creation and modification of digital resources	3,52	3,52	0
3.3. Management, protection and sharing of digital resources	3,96	3,64	0,32
3.4. Empowering learners for effective use of ICT	4,60	4,08	0,52
3.5. Facilitating learner's digital competence	4,32	4,08	0,76

By generalizing the data of all respondents by mean, the I Learning and Assessment Criterion, which should be in the focus of further development planning of PCAS, has been evaluated higher (3,83) than II Research-innovative Criterion (3,73) and III Digital Criterion (3,73). That contradicts with the theoretical part, concerning the proportion of criteria of didactical framework for the assessment of PCAS, where the majority should be presented by Research-Innovative and Digital Criteria, while Learning and Assessment Criterion was evaluated higher in the empirical research (see Figure 3.7).

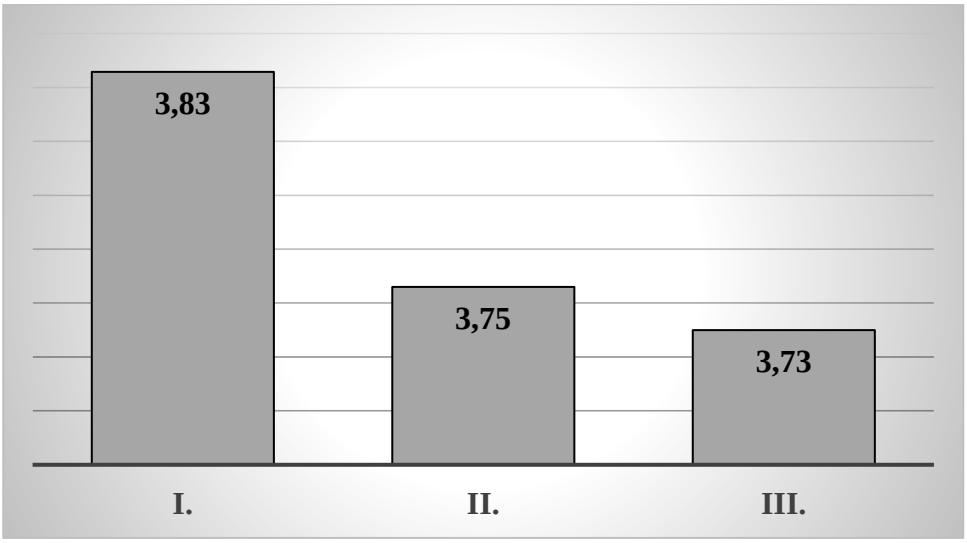


Figure 3.7 **General Mean by Three Criteria**

By drawing parallels with the scientifically-theoretical basis, the student-centered approach from the perspective of AS should be considered on the mandatory bases.

For forming the general conclusion in both perspectives: self-assessment and students' assessment, using Kolmogorov-Smirnov Test the mean was determined for each indicator, see Table 3.6.

Table 3.6

Apply Index from Both Perspectives

Criteria/Indicator	Mean
I Learning and Assessment	
1.1. Individual differences of students, personalization	3,39
1.2. Goals and learning outcomes	**4,02**
1.3. Study course content	**4,21**
1.4. Teaching methods, models and strategies	3,80
1.5. Study environment	3,82
1.6. Assessment and feedback	**4,00**
1.7. Reflection	3,54
II Research – innovative	
2.1. Professional engagements	3,64
2.2. Organizational communication	3,71
2.3. Professional collaboration	3,70
2.4. Reflective practice	3,69
2.5. Continuous self/professional development	3,99

III Digital	
3.1. Selection of digital resources	**4,06**
3.2. Creation and modification of digital resources	3,60
3.3. Management, protection and sharing of digital resources	3,67
3.4. Empowering learners for effective use of ICT	3,66
3.5. Facilitating learner's digital competence	3,66

The highest value was observed for indicators: 1.3. study course content (4,21), then 3.1. selection of digital resources (4,06), 1.2. goals and learning outcomes (4,02) and 1.6. assessment and feedback. While, the lowest value is observed for indicator 1.1. individual differences of students, personalization (3,39). This indicator should be considered on the mandatory basis.

There are no statistically significant differences for the perspective of students, neither for the criteria nor for the indicators for the age, the education or the study field, as no correlation was found. While the analyses of both perspectives are shown further.

In order to approve the readiness, concerning some indicators, the percentage of responses ALWAYS and OFTEN was analyzed (see Appendix 27). The highest percentage of reply ALWAYS corresponds to the following statements: 1.3. Study course content (42%); 1.6. Assessment and feedback (42%) and 1.2. Goals and learning outcomes (36%). While the highest percentage of reply OFTEN corresponds to the following statements: 1.5. Study environment (55%); 2.1. Professional engagements (47%); 2.4. Reflective practice (42%); 1.4. Teaching methods, models and strategies (45%). It is quite a surprise to find that study environment is among highly evaluated from the readiness perspective, while the aspect of offline or online study environment wasn't specified.

Data Triangulation

The research problem was addressed to the respondents of three HEIs: Riga Technical University, Rezekne Academy of Technologies and Tallinn University of Technology, in order to enhance the validity of the findings. As during practice, the comparative analyses of three HEIs were conducted for the perspective of the assessment process of AS, and it was concluded (see Table 27) that TalTech evaluation matrix is a detailed tool for the assessment, while additional criteria and indicators should be added to the assessment questionnaire of RTA and RTU, concerning teaching, learning and assessment, while the digital aspect should be

additionally specified for all three HEIs, so the same HEIs were chosen for data triangulation. The distribution of respondents by HEIs is presented on Figure 3.8.

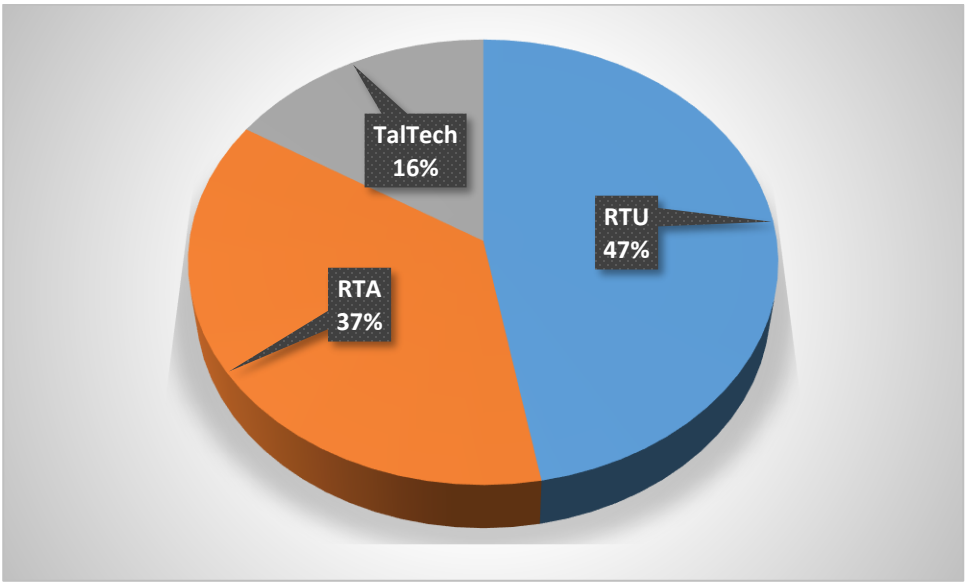


Figure 3.8 **Distribution of Respondents by HEI**

As this is case study, a research method to generate an in-depth multi-faceted understanding of the assessment process of PCAS in real-life context. So, by using Kruskal-Wallis Test by rank, HEIs, to determine whether samples originate from the same distribution, in the current case to compare the samples of three HEIs, where the significance level is set at p = .05.

Kruskal-Wallis (N) value for three criteria is presented in Table 3.7, the p-value is larger, so the null hypothesis is retained.

Table 3.7

p-value for Three Criteria

	I. Criteria	II. Criteria	III. Criteria
Kruskal-Wallis p-value	.108	.136	.132

While the Mean Rank by the higher education institutions is presented in Table 3.8.

Table 3.8

Kruskal-Wallis Mean Rank for Three Criteria

Criteria	HEIs	N	Mean Rank
I Criterion	RTA	35	40,33
	RTU	38	42,67
	TalTech	14	56,79
	Total	87	
II Criterion	RTA	35	46,00
	RTU	38	38,63
	TalTech	14	53,57
	Total	87	
III Criterion	RTA	35	44,61
	RTU	38	39,34
	TalTech	14	55,11
	Total	87	

The detailed analyses of all 17 indicators are presented in Appendix 28, where the p- value is observed less than .05 for the following indicators:

- 1.2. goals and learning outcomes (.003);
- 1.3. study course content (.023);
- 2.3. Professional collaboration (.032);
- 2.4. Reflective practice (.046);
- 2.5. continuous self and professional development (.002);
- 3.1. selection of digital resources (.000);

The Mean Rank triangulation for the listed indicators is presented in Table 3.9.

Table 3.9

Kruskal-Wallis Mean Rank for Indicators

	RTA (35)	**RTU (38)**	**TalTech (14)**
1.2. goals and learning outcomes	37,39	43,14	62,86
1.3. study course content	37,00	45,72	56,82
2.3. Professional collaboration	50,20	36,29	49,43
2.4. Reflective practice	39,77	42,67	58,18
2.5. continuous self and professional development	40,70	39,50	64,46
3.1. selection of digital resources	37,63	40,74	68,79

That means there are significant difference between the indicators for the specified HEIs. By generalizing the results, the Mean Rank is considerably higher for TalTech, especially for 3.1. selection of digital resources (68,79) and 2.5. continuous self and professional development (64,46), while for 2.3. professional collaboration (49,43) it is similar to RTU (50,20), while considerably higher than RTA value (36,29).

Following the findings, there is a need to clarify the difference between the values in one more perspective – by countries: Latvia and Estonia. As only two groups are specified Mann-Whitney U Test is used to determine are groups likely to derive from the same population (Cohen, Manion, Morrison, 2018). The data for three criteria is presented in Appendix 13, there is no statistically significant groups. As the value is less than 0.3, so the effect is small: I Learning and Assessment Criterion (.078); II Research-innovative Criterion (.222); III Digital Criterion (.076), while the Mean Rank is higher in Estonia for three criteria.

By comparing the indicators, the statistically significant ones by country are the following:

- large effect: 1.1. Individual differences of students, personalization (.768); 1.5. Study environment (.554); 2.1. Professional engagements (.538); 2.2. Organizational communication (.931); 3.4. Empowering learners for effective use of ICT (.703);

- medium effect: 2.3. Professional collaboration (.393) and 3.4. Empowering learners for effective use of ICT (.333).

The value is less than 0.3 for other indicators. The Mean Rank by countries is presented in Appendix 30, and for all indicators the Mean Rank value is higher in Estonia, the only exception is indicator 2.1. Professional engagements (40,77 to 44,66). A noticeable difference

is observed in the Mean Rank of indicator 3.1. selection of digital resources (39,26 in Latvia to 71,00 in Estonia) see Appendix 30,31.

The specified analysis of statistics showed the relationship between variables, considering the statistically significant differences, while there is a need to clarify the causation of the findings.

Qualitative Analysis

Besides the quantitative data, the qualitative data analyses were conducted. By answering the open-ended questions, concerning the three specified criteria, additional indicators were listed, to enlarge the understanding of the following: learning and assessment, research-innovative and digital.

Content analyses approach was used for data processing. The inductive reasoning (Gay, Mills, Airasian, 2012) is used, developing the generalization based on a limited number of answers of the respondents for the indicated issues, three steps generalization is used: data coding, by content unit; generalization of the categories; development of concept. The theoretical coding (Kroplijs, Raščevska, 2010) is used, as the development of concepts is based on the scientifically-theoretical background of the current research.

First, the ideas from the perspective of AS were analysed through the specified three stages content analyses approach: content unit was specified (the reply of the respondent), then the category was generalized and the concept was developed (the example of content analyses is presented in Table 3.10), while the whole list form the perspective of AS is presented in Appendix 32, while the perspective of students is shown in Appendix 33.

Table 3.10

Sample Analyses of Content, Unit, Categories and Concept (AS)
(created by researcher)

Content Unit (particular, specific)	**Category** (general, abstract and scientifically expressed)	**Concept** (scientific, applicable to the theory)
I. Learning and Assessment		
Motivation of students and AS	Motivation	**Motivation, Engagement**
Self-driven education, engagement	Engagement	
Engagement, use of knowledge in certain situations	Engagement	
Continuous development	Continuous development	**Continuous development**
Participation in different training for the development of pedagogical competence	Development of pedagogical competence	
Continuous development	Continuous development	
Development	Development	

By drawing parallels, the list of additional concepts has been highlighted from both AS and students' perspectives and is presented in Figure 3.9, considering the indicators for I Learning and Assessment Criterion is presented.

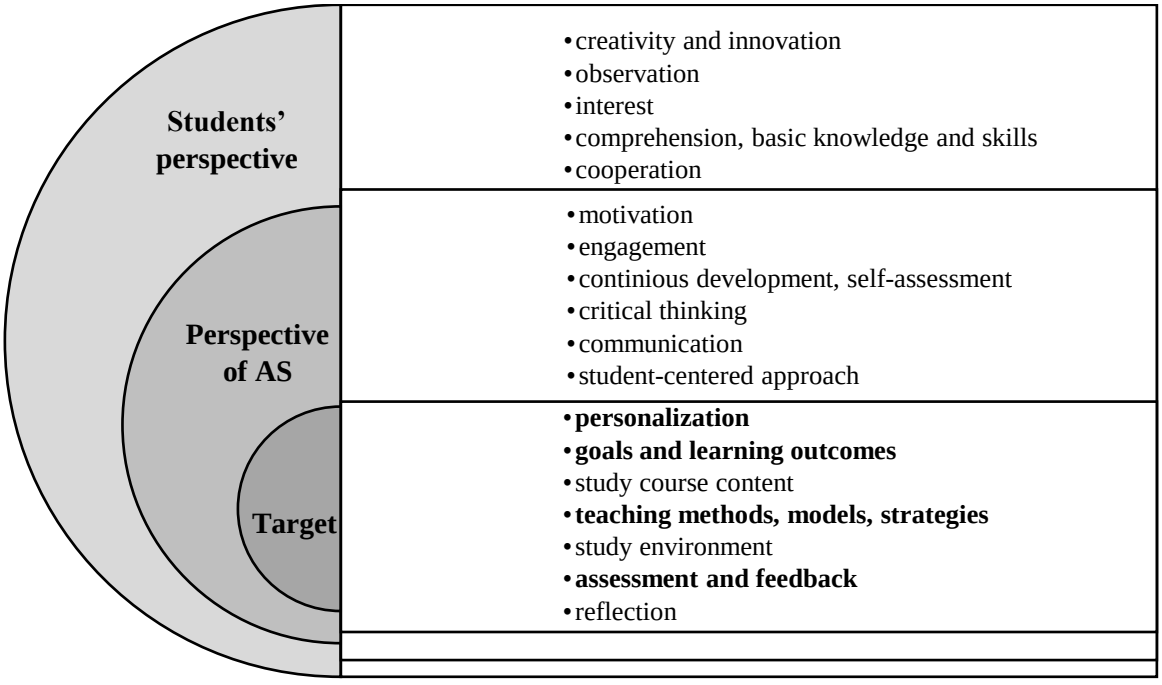


Figure 3.9 **I Learning and Assessment Criterion**

First, the target indicators are shown, then six more indicators are added in accordance to the concepts of AS and five more from students, only those that differ from target and AS. By analysing the similar concepts from both perspectives in comparison with target one, the following are specified: motivation, assessment/evaluation, feedback and reflection, continuous development. While for students the basic knowledge, skills and comprehensions is especially important. While for AS self-assessment is specified.

For II Research-innovative Criterion the parallels are presented in Figure 3.10. Reflective practice and continuous self- and professional development are specified by both AS and students and are common to the target indicators, while six more concepts are added from the perspective of AS. It is important to indicate that critical thinking and innovations are specified for both I Criterion and II Criterion, only the focus is different.

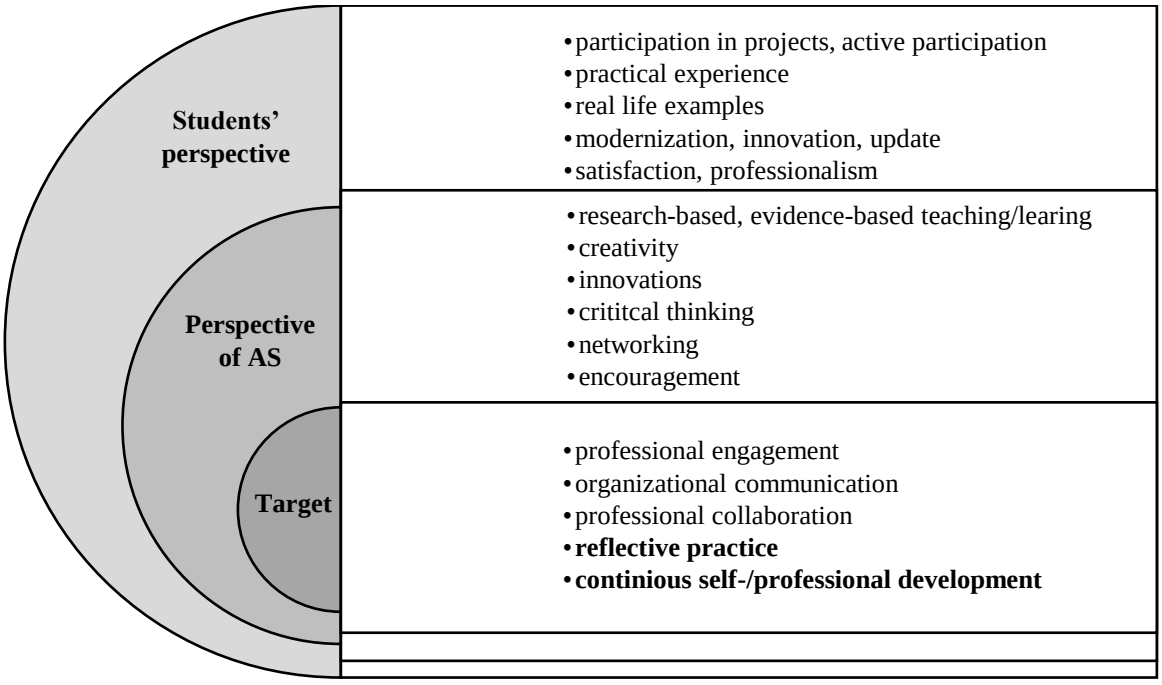


Figure 3.10 **II Criteria – Research - Innovative**

Finally, III Digital Criterion was analyzed (see Figure 3.11). The tendency presented confirms the need to include digital aspect in teaching/learning criteria, as this is an integral part to ensure innovative methods, strategies and approaches.

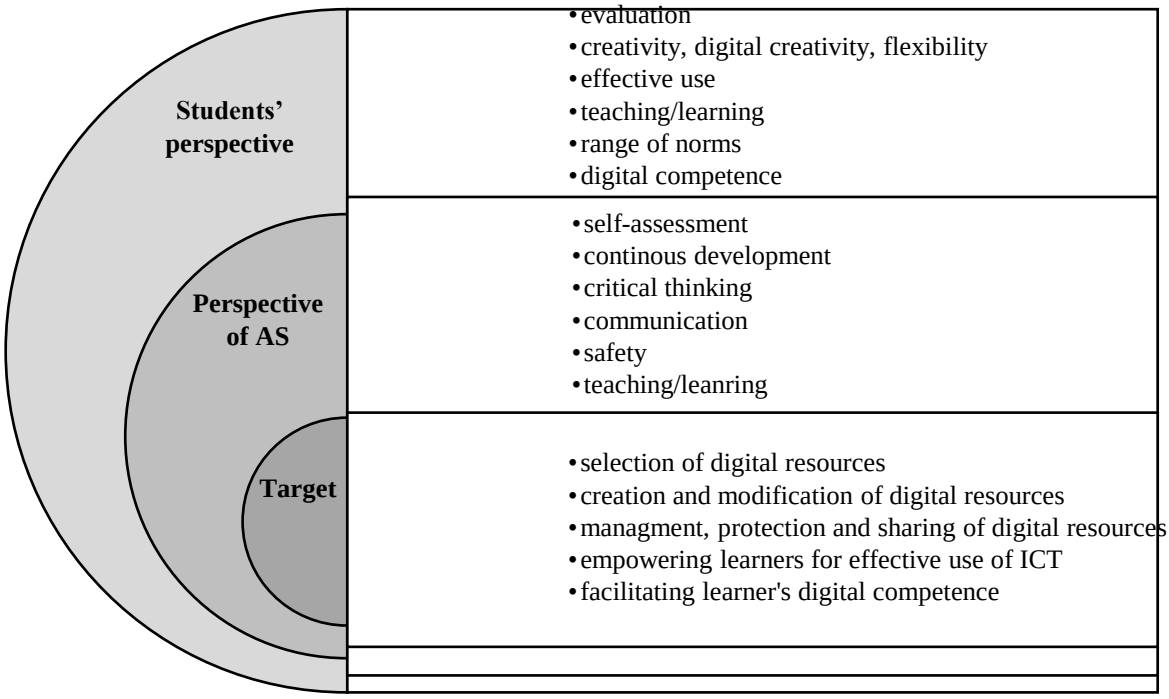


Figure 3.11 **III Digital Criterion**

Summarizing the findings of the three specified criteria, it can be concluded that critical thinking should be considered overall, as this should be emphasized for conscious use of ICT, while to ensure professionalism in each field, continuous self- and professional development is essential. Improvement is needed not only teaching/learning, but also research-innovative and digital criteria, through the implementing of innovations, creativity, modernization, effective use and updates, ensuring a high level of mastery, which should be evaluated through additional questionnaire (see Appendix 36).

Moreover, NVivo - a software program for qualitative and mixed-methods research -was used. In order to generalize the answers to the open-ended questions, the following points were analyzed: the presence of separate words and the word frequency criteria. The following codes were used to check the presence (teaching, learning, research, innovations and digital, which correspond to the I Criterion, II Criterion and III Criterion). The data analyses are presented in the Appendix 34. The most used words are teaching and learning, while in addition to the indicated codes, the words creativity and development are mentioned. The word cloud was offered for visual recognition, in which the words digital, competence and information are also specified (see Appendix 35). Further, the data analyzes for the discussion of experts was offered in order to evaluate the criteria and indicators specified to make corrections if necessary. In

February 2023, the discussion of engineering field experts was organized in RTU, where six engineering PhD professionals expressed their opinion on the necessary amendments of the offered didactical framework for the assessment of PCAS. Based on the consensus, the updated version of the criteria and indicators was offered (see Figure 36).

The core priority cited by the experts covered the idea that I Criterion, previously named as Learning and Assessment, should be reformulated as Teaching, Learning and Assessment. The idea was already confirmed during the TEST questionnaire, as well as by the answers to the open-ended questions, where the teaching and learning aspect was equally emphasized. As the focus of the current PhD research is on non-teacher trained AS, so I Teaching/Learning and Assessment Criterion is the most important, hence the number of indicators was updated. Previously, seven indicators were expanded to twelve, according the final consensus of experts. Some of the indicators was removed from II Research-innovative Criterion and III Digital Criterion, for example, continuous development, effective communication/collaboration and facilitating students' learning. Therefore, the number of indicators from II Criterion and III Criterion were deducted to two indicators. This means that the specified proportion of the developed didactic framework is mathematically proven by specifying I Teaching/Learning and Assessment Criterion as 75%, while the left 25% are formed by II Research-innovative Criterion and III Digital Criterion.

Moreover, additional concepts and explanations are provided by formulating the indicators for each criterion, as based on the research results, a clear formulation of the statements is required by ensuring a clear understanding of the indicated aspect. For example, with regard to the study environment, both offline and online environment are specified, in addition, for effective communication, individual, pair, and team aspect are listed. Furthermore, the idea of innovation and creativity is added to teaching/learning that is the core priority of Smart Pedagogy, while in the context of Engineering Pedagogy, effective professional practice is specified, with all corresponding activities (collaboration, communication, networking, engagement, creativity, reflection, commercialization), that dictates continuous self- and professional development not only in teaching and learning, but also in research and innovation (see Figure 3.12).

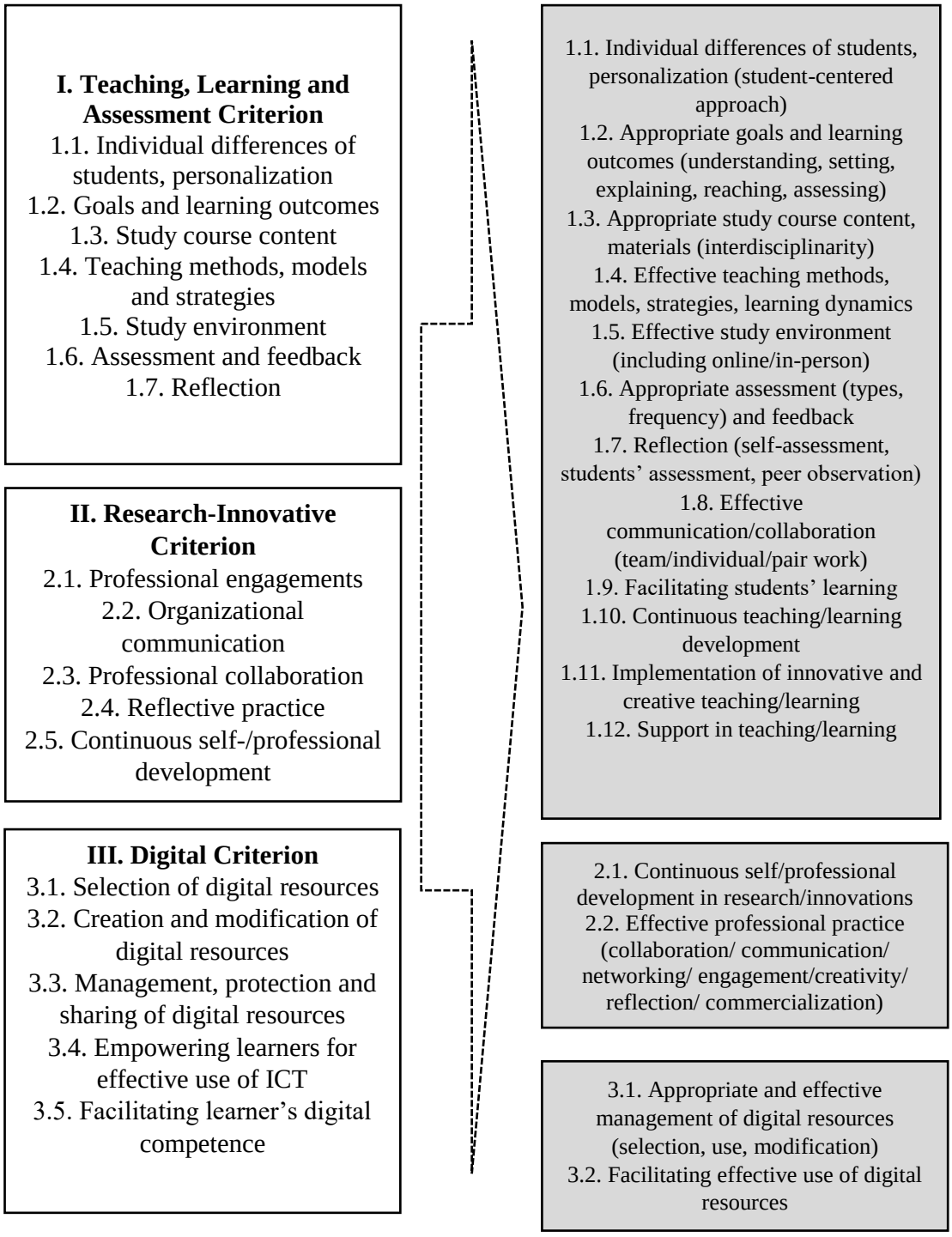


Figure 3.12 **Updated Didactic Content for the Assessment of PCAS**

(created by researcher)

In accordance with the results of the current PhD research, the proposed didactic framework (fig. 2.1) was improved, considering the updated didactic content (fig. 3.12) the clear proportion of the three criteria is defined, formed by sixteen indicators. The distribution of indicators is as follows: two for Digital Criterion; two for Research – innovative Criterion and twelve for Teaching/learning and Assessment Criterion, forming 75% of the total content (see Figure 3.13), following the recommendations and guidelines gained from the discussion of engineering field experts.

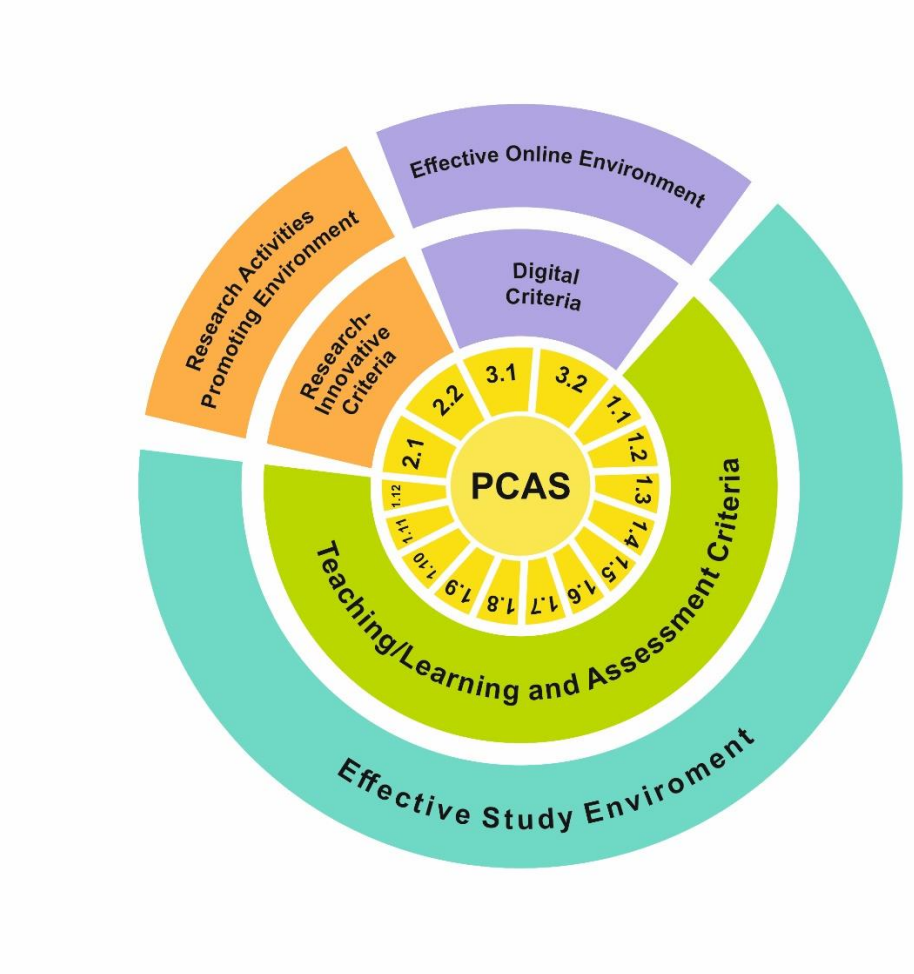


Figure 3.13 **Updated Didactic Framework for the Assessment of PCAS**
(created by researcher)

Moreover, the author believes that in order to further improve the didactic framework, additional aspects should be studied (psychological, pedagogical, social), since the framework offered mainly covers the didactic content, considering the current trends and challenges of HE,

taking Smart pedagogy and Engineering pedagogy as driven forces for further transformation, helping to specify the additional features for effective implementation and better performance.

Based on the analyses obtained during the process of verifying the effectiveness of the didactic framework for the assessment of PCAS, the following conclusions can be drawn:

1. It is complicated for AS of HEIs, especially non-teacher trained AS, to process and organize the concept related to PCAS as there is no clear understanding that in any way governs the planning and implementation of the assessment process of AS in any HEI. Research data shows that clear and transparent systematic assessment system for PCAS should be developed, in which the proportion of specified criteria and indicators related to teaching and learning is significantly higher than that of research-innovative and digital, while the observing the direct linkage should be.

2. According to quantitative data analyzes, the following key features were observed:

- the Importance Index was offered for TEST questionnaire and self-assessment of AS; the results of TEST questionnaire for both Importance and Readiness Indices were higher in comparison with self-assessment questionnaire;

- Importance Index was only offered for AS, in accordance to the Mean results, the Importance Index is higher than Readiness Index for three specified criteria: (I Learning and Criterion - 4,7 to 4,3; II Research-innovative Criterion - 4,5 to 3,9 and III Digital Criterion - 4,4 to 3,9), while for the indicators only two exceptions were observed for 1.6. assessment and feedback and 2.3. professional collaboration;

- Readiness Index from the perspective of AS was higher than from students' perspective; two exceptions were observed for the following indicators: 3.2. creation and modification of digital resources and 3.2. management, protection and sharing of digital resources).

- the highest Mean of Readiness Index from both perspectives was observed to I Learning and Assessment Criterion (3,83), and was opposite to the offered proportion of didactic framework;

-the highest Mean of Readiness Index from both AS and students' perspectives was observed for four indicators: 1.3. study course content (4,21), 3.1. selection of digital resources (4,06), 1.2. goals and learning outcomes, 1.6. assessment and feedback (4,00);

- data triangulation showed the highest Mean Rank as for three criteria (I Learning and Assessment Criterion - 56,79 TallTech, 40,33 RTA, 42,67 RTU; II Research-innovative Criterion - 53,57 Taltech, 46,00 RTA, 38,63 RTU; III Digital Criterion - 55,11 Taltech,

44,61 RTA, 39,34 RTU), same to all 17 indicators with the highest values of Taltech (with the highest value in total to indicator - 3.1. selection of digital resources);

- there are no statistically significant differences by the country (Latvian and Estonian) for three criteria, while for the indicators the largest difference is observed to indicators - 1.1. individual differences of students, personalization (.768); 1.5. Study environment (.554); 2.1. professional engagements (.538); 2.2. organizational communication (.931); 3.4. empowering learners for effective use of ICT (.703).

3. According to qualitative data analyzes, the following key features were observed:

- from the perspective of HIEs, systematic progress control is necessary for continuous self- and professional development;

- there is a need to draw the parallels between the self-assessment and students' assessment in order to improve the reliability of the results, therefore the assessment tools for self-assessment and students' assessment should be identical;

- the offered assessment tools should clearly specify the criteria and indicators to prevent any misunderstanding;

- the continuous self- and professional development is the primary tenets for high quality and mastery, as in teaching/learning and assessment, as in research-innovative aspect;

- additionally, the mastery level evaluation is required, within the current research the additional questionnaire is offered for this purpose (see Appendix 35);

4. The specified proportion of the developed didactic framework for the assessment of PCAS is offered, considering the needs of non-teacher trained AS, and is mathematically proven by specifying I Teaching/Learning and Assessment Criterion as 75%, while left 25% formed by II Research-innovative Criterion and III Digital Criterion, considering the recommendations and guidelines gained from the discussion of engineering field experts.

3.3. Guidelines and Practical Considerations for the Assessment and Development of Pedagogical Competence of Academic Staff

The process PCAS formation covers the basic ideas from pedagogical and didactic theories, additionally paying attention to three specified dimensions: international, European and Latvia, while the Latvian dimension is formed by the official information form Ministry of Education and Science Republic of Latvia, Law of Higher Education Institutions, Educational Law, corresponding regulations of Cabinet of Ministers and strategic documents of the Republic of Latvia, reflecting the student learning-centered paradigm, effective use of ICT for ensuring DT and LLL.

As previously mentioned, the Covid-19 pandemic has triggered a worldwide shift towards online learning and teaching, hence the transformation of the pedagogical process has taken place. This idea was already explored before the pandemic, as teaching/learning is viewed as a cyclical process that involves incorporating new innovations, modifying the content of teaching, changing teaching strategies, developing new teaching materials, planning updates of competences, etc. (Daniela, 2019), offering the concept of Smart pedagogy as a transformative force for reflecting to the technological progress, technological and digital solutions for education, including HE (Daniela, 2018), while in the context of non-teacher trained AS, the concept of Engineering pedagogy, offered by R. Sell and T. Ruutmann was considered, emphasizing the need of PCAS to shape a better person, who should be able to learn and teach and be constantly open to new ideas, challenges and professional innovations, paying special attention to digital innovations (Sell, Ruutmann, 2015).

Moreover, the European strategy for universities sets out supporting conditions for HEIs to promote the post-pandemic recovery and to equip AS with the right competences and skills, by providing flexible and attractive career structures, open to innovations and new challenges (European Commission, 2022). Competent and dedicated AS is therefore a necessity for HEIs to provide high-quality education and scientific excellence. This means that AS must be proficient both in the particular discipline and in pedagogy, while PC is often undefined and not clearly structured for the evaluation and assessment.

The current PhD thesis found that there is no clear understanding of the concept of PCAS in HE, the general insight is fragmented and should be clarified in three dimensions: at state

level, at institution level and at individual level, to establish and specify the key principles for PC formation, where the role of each element involved is given.

At the state level, there is a need to recommend HEIs to adopt the transparent assessment system to ensure the high level of mastery in teaching and learning and scientific excellence under the concept of continuous development of PCAS for effective DT. The concept should be reflected in the development strategies of HEIs.

Moreover, considering smart pedagogy and engineering pedagogy as transformative forces to ensure smart student and smart AS, the provision of necessary digital solutions should be provided at the state level, to offer equal opportunities to HEIs within the national development programs to implement DT.

At the institutional level, there is a need to create a clear understanding of the concept of PCAS, especially in technical universities, for non-teacher trained AS with no pedagogical background and the need for its continuous development and improvement, offering a transparent assessment system and explaining the direct connection with the perspective of further academic career development. Moreover, the didactic framework for the assessment of PCAS should be adopted to the needs of each HEIs and cover the core criteria and indicators, with the proportion of each criteria being justified. The direct connection of the assessment of PCAS with the current evaluation system is strongly recommended so that progress is systematically reviewed further development planned, using the results to provide targeted feedback and support AS. Moreover, regular review and update of the assessment process is recommended in order to ensure that it remains effective and relevant to the needs of HEI, keeping in transparent and fair.

In addition, the availability aspect should be considered by securing the appropriate ICT for either AS or students effective application and use, providing training where needed.

At an individual level, for the further development of PCAS, the following primary didactic tenets should be considered and grouped according to the developed framework, where smart pedagogy and engineering pedagogy being the transformative forces within the given TDL context:

I. in order to ensure the quality of Teaching/learning and Assessment Criterion, AS should consider the following:

- follow student learning-centred paradigm by implementing individualization and personalization of the study process in HEIs, considering the needs of each student by trying to make re-designed, creative offers and innovative solutions;

- to clearly specify and strategically evaluate the appropriate goals and learning achievements, regularly innovated and renewed in accordance with the perspectives and priorities of HE;

- to prepare and offer the study course content in accordance to the clearly defined goals and learning achievements by securing research-promoting environment in individual discourse;

- to apply and use the various methods, models, approaches and strategies, that are systematically innovated, research-based, renewed and digitally supported;

-to create such study environment that confirm the significance of teaching and learning and facilitating scientific-research work, combining the offline and online options;

- to implement an innovative assessment with the critically reflected feedback through the multitude of tools on the regular bases (frequency aspect), covering the evaluation of the corresponding competence.

- reflection should be one of the core elements for further improvements and development planning, including assessment of AS through different types of assessment (self-assessment, students' assessment, mastery level evaluation, peer observation);

- to ensure effective communication, either with students and peers or with the leadership team of HEIs for effective work and development, considering the networking opportunities;

- to facilitate students' learning from teaching and learning perspective to ensure better achievements, motivate and arouse interest in the field, engagement;

- to continuously develop teaching/learning considering innovative solutions, research-based approach, digital solutions and features of smart pedagogy and engineering pedagogy, using examples of good practices;

- to effectively implement the innovative teaching/learning by modernization and updating the traditional to transformative approaches;

- to support teaching/learning from different perspectives;

II. in order to ensure Research – innovative Criterion, the following primary tenets should be followed:

- the continuous self- and professional development in research/innovations on a regular basis in order to offer innovative and research-based solutions and to ensure the scientific excellence for a high level of mastery and professionalism;

- effective professional practice should be provided for effective collaboration, exchange and sharing of ideas, best practices, engagement, creativity and commercialization;

III. in order to ensure Digital Criterion:

- appropriate and effective management of digital resources (selection, use, modification, safety) should be offered through effective use of ICT to improve digital competence;

- to facilitate the effective use of digital resources from both AS and students' perspectives.

The criteria and indicators of the improved didactic framework for the assessment of PCAS developed as part of the current PhD thesis were based on the criteria and indicators of didactic framework of engineering pedagogy (Ruutmann, Sell, Lohmus, 2018), the digital competence framework for educators (Punie, Redecker (Eds.), 2017), considering certain tasks and activities of AS in HEIs with smart pedagogy (Uskov et al., 2018; Daniela, 2018; Karkazis, 2019; Meng, Jia, Zhang, 2020) as transformative force aimed at achieving results, professional development opportunities, improvement and development needs, based on the obligations to ensure the effective study process, promote scientific excellence and ensure smart student and smart AS in future perspective of DT and the TDL context in HEIs.

Thus, assessment of PCAS is important for a number of reasons:

1) ensuring quality of higher education: as PCAS has a direct impact on the quality of teaching and learning provided to students. Therefore, it is important to assess it in order to ensure the high quality and effectiveness of the study process;

2) meeting educational standards: assessment of PCAS ensures that AS meet the required educational standards set by the HEIs and state legislation.

3) enhancing teaching skills: assessment of PCAS can identify areas of weakness in the teaching skills of AS, and provide them with opportunities to improve their skills;

4) encouraging continuous self- and professional development: assessment of PCAS can motivate AS to engage in continuous self- and professional development to improve their competence and skills;

5) increasing satisfaction of students: assessing PCAS can help to ensure that students are satisfied with the quality of education they receive, which can improve their achievements;

6) improving job satisfaction: assessment of PCAS can help to identify areas where AS require support, which can improve their job satisfaction;

7) improving performance of HEIs: HEIs that regularly assess PCAS are better able to identify areas of weakness and implement strategies to improve their overall performance for ensuring mastery teaching/learning and scientific excellence.

In conclusion, assessment of PCAS is crucial for ensuring quality of higher education, meeting educational standards, enhancing teaching skills, encouraging self- and professional development, increasing satisfaction of students and AS, and improving overall performance of HEIs.

CONCLUSION

This chapter provides the conclusions of the current PhD research. It summarises the research by revisiting the research aim, tasks and questions, and then highlights the key findings of theoretical bases that provide the conceptual framework for the formation of pedagogical competence of academic staff, didactic framework for the assessment and development of pedagogical competence of academic staff, and empirical research, reflecting the effectiveness of its implementation. Boundaries and directions for future research are outlined. Guidelines and practical considerations at state, institutional and individual levels are formulated.

In accordance with the aim and tasks of PhD thesis, the theoretical literature in pedagogy, psychology, methodology and relevant documents in three dimensions: international, European and Latvia, were explored, covering general concepts of: academic staff (*Houston, Meyer, Paewai, 2006; Cadez, Dimovski, Groff, 2017; Videnere, Bogdanova, 2019; Vaidya et al., 2022)*; teacher-trained and non-teacher trained academic staff *(Voss, Gruber, 2006; Graham, 2015; Kersten, 2018; Ruutmann, 2020)*; competence *(Maslo, Tiļļa, 2005; Chong, Cheah, 2010; Ravotto, 2011; Baartman, de Bruijn, 2011; Chilingaryan, Illeris, 2013; Vitello, Greatorex, Shaw, 2021)*; pedagogical competence (*Apelgren, Giertz, 2010; Ryegard, Olsson, 2010; Suciu, Mata, 2011; Redecker, Johannessen, 2013; Febrianis, Muljono, Susanto, 2014; Dagar, Yadav, 2016; Aimah, Ifadah, Bharati, 2017; Sahana, 2018; Novianti, Nurlaelawati, 2019; Fakhrutdinova et al., 2020; Liu, Zhao, Su, 2022*); theories for the formation of structure of pedagogical competence: constructivism (*Sjøberg, 2010; Űltanir, 2012; Dennick, 2016; Dagar, Yadav, 2016; Taber, 2019; McLeod, 2019; Mukhalalati, Taylor, 2019, Akpan et al., 2020*); connectivism (*Siemens, 2005; Siemens, 2006; Marhan, 2006; Duke, Harper, Johnston, 2013; Herlo, 2017; Boyraz, Ocak, 2021*); activity theory *(Engestrom, 2000; Hashim, Jones, 2007; Blunden, 2015; Ploettner, Tressaras, 2016; Mikhalenko, Blayone, Žogla, Ļubkina, 2019);* smart pedagogy *(Daniela, 2018; Meng, Jia, Zhang, 2020; Uskov et al., 2018, Karkazis et al., 2019)*; engineering pedagogy *(Sell, Ruutmann, 2015; Ruutmann et al., 2022)*; theories for the development and assessment of pedagogical competence: taxonomies of learning (*Bloom's taxonomy - Bloom, 1956; Kolb's learning cycle – Kolb, 1975; SOLO taxonomy – Biggs & Collis, 1982; Feisel-Schmitz technical taxonomy – Feisel-Schmitz, 1986; Gibbs reflective cycle – Gibbs, 1988; Webb's Depth-of-Knowledge Model -Webb, 1997; New taxonomy - Marzano & Kendall, 2007; Gibbs, 2013; Hogfeldt, n.d.);* teaching/learning theories *(Logvinov, 2003;*

Bernāte, Birziņa, Kurloviča, 2014; Petrenko, 2015; Andersone, 2017; Subakir, 2017; Žogla, 2017; Schieber, 2018; Valtonen et al., 2021; Kaplan, 2021; Ruutmann et al., 2022); theories of transformative digital learning context: transformative learning theory *(founder Mezirow, 1978; updated, 1991, 1996; Taylor, Neter, Wayment, 1995; Taylor, Cranton, 2013);* digital transformation *(Tulchinskij, 2017; Elliott, 2017; Alcatel-Lucent, 2018; Visvizi, Lytras, Daniela, 2018; Uvarov et al., 2019; Dobrica, 2019; Mahlow, Hediger, 2019);* transformative digital learning *(Mykhailenko, Blayone, Žogla, Ļubkina, 2018; Bautista, Cipagauta, 2019; Žogla, 2021; Vindača, Ļubkina, Abuže, Ušča, 2021; Špona, 2022*).

This research aims to explore the essence of the assessment and development of pedagogical competence of academic staff in the transformative digital learning context in higher education institutions. By completing all the outlined tasks, the research aim was achieved.

The first task was *to explore scientific approaches and theoretical findings on the didactic bases for the assessment and development of pedagogical competence of academic staff, to formulate the definition of pedagogical competence and transformative digital learning, to scientifically justify the essence and structure of pedagogical competence development in the transformative digital learning context*. This task has been fulfilled. First, the concept of competence and the concept of pedagogical competence have been analyzed, identifying the core components of the essence and structure of pedagogical competence of academic staff and offering its definition as **a set of knowledge, skills and psychosocial factors, for enhancing the effective teaching/learning process in the higher education institutions, considering the study-environment, student-centred approach, lifelong learning and continuous development to meet the requirements of updated trends in the field of educational science such as innovations, digitalization and globalization.** Second, the concept of teaching/learning in higher education institutions have been analyzed, highlighting the future perspectives of higher education as paradigm shift (following student-centered approach), effective use of ICT and continuous self/professional development as a core perspective of lifelong learning, emphasizing the need of digital transformation and offering the definition of the transformative digital learning within the context of current PhD research as **the process of individualized, lifelong spontaneous or planned technology - enhanced learning, changing and updating of educational results, content, methods and organizational form adopting them to the quickly evolving digital environment, including physical and philosophical**

change or transformation to meet growing demands of learners to achieve rich intellectual property by defining new perspectives and adopting personal worldview accordingly value-created learning. Third, the implementation of pedagogical competence development through such pedagogical theories as constructivism, connectivism, activity theory, smart pedagogy, engineering pedagogy and pedagogical practices of the following perspectives: international (perspective of Canada), European (perspectives of Denmark, the UK, Ireland, Estonia and Lithuania) and Latvian perspective have been analyzed, developing the conceptual framework of the current PhD research, where smart pedagogy and engineering pedagogy are driven forces for the transformation of higher education pedagogy.

The second task was *to clarify the readiness of the target group (through three-level evaluation system) and the needs for the further development and improvement of pedagogical competence of academic staff (self-assessment, students' assessment, mastery level evaluation).* This task has also been achieved. First, the exploration of the concept of academic staff in general, covering the definition of academic staff by linkage of teaching/learning and research activities was offered in international, European and Latvian dimensions, considering the ranks system and career path for academic staff with the reflection on Latvian perspective and a proposal for a 4- level/ranking transition instead of existing 5-level ranking, where the highest level of achievement is proposed as masterful teaching, providing high-quality teaching and learning, following innovative trends of higher education. Second, two types of academic staff were specified: **teacher-trained academic staff with pedagogical background and non-teacher trained academic staff with no pedagogical background,** while the current PhD research was focused on non-teacher trained academic staff. The readiness of the target group was specified through pilot research, mapping the need and scope of assessment of pedagogical competence of academic staff, including the institutional perspective and the perspectives of students and academic staff, reflecting the comparative analyses of existing assessment procedure of three higher education institutions: Riga Technical University, Rezekne Academy of Technology, Tallinn University of Technology and interview of experts within RTU Methodological conference, the findings of RTU tenure project and RTU competence project. While, the effective implementation of future perspectives of higher education is based on the assessment of current achievements of academic staff that is currently based on the Regulations of Cabinet of Ministers Nr.129, covering three areas: scientific qualification (research), pedagogical qualification (digitalization, transformation and innovations) and organizational

work (management, leadership), while the assessment of didactical aspect as a background that ensures the effectiveness of the study process is not included.

The third task *was to work out the criteria, indicators and levels for the assessment of pedagogical competence of academic staff*. Grounded on the theoretical bases, conceptual framework and the needs of target group, non-teacher trained academic staff, **three groups of criteria have been offered: learning and assessment, research-innovative and digital**, specifying the corresponding number of indicators. While during the empirical research, considering the findings of the applied Delphi method for the interview of experts and discussion of engineering field experts followed, the first group was re-defined as teaching/learning and assessment, while two others left unchanged, the indicators have also been updated from both perspectives of academic staff and students. So, teaching/learning and assessment criteria is formed of twelve indicators: individual differences of students, personalization; appropriate goals and learning outcomes; appropriate study course content, materials; effective teaching methods, models, strategies, learning dynamics; effective study environment; appropriate assessment and feedback; reflection; effective communication/collaboration; facilitating students' learning; continuous teaching/learning development; implementation of innovative and creative teaching/learning; support in teaching/learning. The research-innovative criteria are formed of two indicators, covering continuous self/professional development in research/innovations and effective professional practice. While digital criteria are formed of the following two indicators: appropriate and effective management of digital resources and facilitating effective use of them. Moreover, **the descriptors for each indictor were developed based on three-level approach**, providing the tool for mastery level evaluation (Appendix 36), following descriptors of basic, intermediate and mastery levels, by mapping the background for further development of pedagogical competence.

The fourth task was *to develop a scientifically based didactic framework for the assessment and development of pedagogical competence of academic staff*. The didactic framework was developed based on the theoretical bases, conceptual framework, and the needs of target group, non-teacher trained academic staff, covering three core criteria and sixteen indicators in total, while the proportion of specified criteria was defined more precisely based on the findings of empirical research and considering recommendations and comments gained from the discussion of engineering field experts, emphasizing **the teaching/learning and**

assessment criteria as the most important, forming 75% (by offering twelve indicators) of the total content, while left 25% are divided between **research-innovative** (by offering 2 indicators) **and digital** (by offering also two indicators) **criteria**, in order to cover the missed didactic aspect for ensuring the high quality of teaching and learning in higher education institutions.

The fifth task was *to conduct the approbation of the didactic framework for the assessment and development of pedagogical competence of academic staff and to determine the effectiveness of its implementation, considering smart pedagogy and engineering pedagogy as transformative forces*. This task has been achieved. According to the scientifically-theoretical analyses and methodology described in PhD thesis the approbation was carried put using the following data collection methods: self-assessment, students' assessment; experts' interview (Delphi method), peer observation and triangulation of quantitative and qualitative data, offering triangulation from the perspective of Riga Technical University, Rezekne Academy of Technologies and Tallinn Technical University the following conclusions were specified:

- it is complicated for non-teacher trained academic staff to process and organize the concept related to PCAS as the clear understanding is required for planning and implementation process, with clear and transparent systematic assessment system, in which the proportion of specified criteria and indicators related to teaching and learning should be significantly higher than that of research-innovative and digital, while the observing the direct linkage should be.
- according to quantitative data analyses, the following key features were observed:

- the results of test questionnaire for both Importance and Readiness Indices were higher compared to self-assessment questionnaire of academic staff;

- Importance Index was only offered for AS, in accordance to the Mean results, the Importance Index is higher than Readiness Index for three specified criteria: (I Learning and Criterion - 4,7 to 4,3; II Research-innovative Criterion - 4,5 to 3,9 and III Digital Criterion - 4,4 to 3,9), while for the indicators only two exceptions were observed for 1.6. assessment and feedback and 2.3. professional collaboration;

- Readiness Index from the perspective of AS was higher than from students' perspective; two exceptions were observed for the following indicators: 3.2. creation and modification of digital resources and 3.2. management, protection and sharing of digital resources).

- the highest Mean of Readiness Index from both perspectives was observed to I Learning and Assessment Criterion (3,83), and was opposite to the offered proportion of didactic framework;

-the highest Mean of Readiness Index from both AS and students' perspectives was observed for four indicators: 1.3. study course content (4,21), 3.1. selection of digital resources (4,06), 1.2. goals and learning outcomes, 1.6. assessment and feedback (4,00). Thus, bot academic staff and students highly evaluated the readiness of academic staff concerning these aspects.

- data triangulation showed the highest Mean Rank as for three criteria (I Learning and Assessment Criterion - 56,79 TallTech, 40,33 RTA, 42,67 RTU; II Research-innovative Criterion - 53,57 Taltech, 46,00 RTA, 38,63 RTU; III Digital Criterion - 55,11 Taltech, 44,61 RTA, 39,34 RTU), same to all 17 indicators with the highest values of Taltech (with the highest value in total to indicator - 3.1. selection of digital resources);

- from the obtained data it is possible to conclude that there are no statistically significant differences by the country (Latvian and Estonian) for three criteria, while for the indicators the largest difference is observed to indicators - 1.1. individual differences of students, personalization (.768); 1.5. Study environment (.554); 2.1. professional engagements (.538); 2.2. organizational communication (.931); 3.4. empowering learners for effective use of ICT (.703).

- according to qualitative data analyses, the following key features were observed:

- from the perspective of higher education institutions, systematic progress control is necessary for continuous self- and professional development;

- there is a need to draw the parallels between the self-assessment and students' assessment in order to improve the reliability of the results, therefore the assessment tools for self-assessment and students' assessment should be identical;

- the offered assessment tools should clearly specify the criteria and indicators to prevent any misunderstanding;

- the continuous self- and professional development is the primary tenets for high quality and mastery, as in teaching/learning and assessment, as in research-innovative aspect;

- additionally, the mastery level evaluation is required for the further evaluation purpose;

- the specified proportion of the developed didactic framework for the assessment of PCAS is offered, grounded **on the discussion of engineering field experts** and considering the needs of non-teacher trained academic staff, and is mathematically proven by specifying I Teaching/Learning and Assessment Criterion as 75%, while left 25% formed by II Research-innovative Criterion and III Digital Criterion, **the updated didactic content and the updated**

didactic framework was offered for the assessment of pedagogical competence of academic staff.

The sixth task *was to work out the guidelines for the assessment of pedagogical competence of academic staff in the transformative digital learning context*. Guidelines and practical considerations were developed at state, institutional and individual levels, emphasizing the need of a clear understanding of the concept of pedagogical competence of academic staff in higher education and a transparent and simple assessment strategy, covering teaching/learning and assessment, research-innovative and digital aspects, where the regular progress check and continuous self/professional development are core priorities for the assessment and development of pedagogical competence of both teacher-trained and non-teacher trained academic staff. Assessment of pedagogical competence of academic staff is crucial for ensuring quality of higher education, meeting educational standards, enhancing teaching skills, encouraging self- and professional development, increasing satisfaction of students and non-teacher trained academic staff, and improving overall performance of higher education institutions. For the value-added assessment of the pedagogical competence of academic staff the offered methodology, which includes the basic principles and the implementation procedure, and covers the aspect of the effective study environment should be followed. The current PhD thesis found that there is no clear understanding of the concept of PCAS in higher education, the general insight is fragmented and should be clarified in three dimensions: at state level, at institution level and at individual level, so the guidelines for the introduction and implementation of assessment tools such as self-assessment, students' assessment and mastery-level evaluation to assess the pedagogical competence of academic staff in the transformative digital learning context have been prepared from the indicated perspectives.

Defined boundaries for the PhD thesis gave an opportunity to set directions for further research, considering the target group of the research still the proportion of the specified groups in the developed didactic framework for the assessment and development of pedagogical competence of academic staff can be updated and improved based on the additional need analyses of academic staff in general, corresponding to another field of the research. The approbation of the didactic model is recommended among the higher education institutions, where the high-quality teaching and learning already ensured by drawing parallels for further improvements.

The approbation gave the opportunity to answer the research questions of the current PhD thesis and put forward three theses for defence.

Based on the conducted PhD research, the following theses are put forward for defense:

1. For the introduction of a thorough and effective assessment of the pedagogical competence of academic staff in the transformative digital learning context, a clear understanding of the concept of pedagogical competence should be provided and the systematic assessment strategy should be developed at the institutional level in accordance to fundamental teaching/learning in higher education in synergy with smart pedagogy and engineering pedagogy as transformative forces, ensuring reflective practice through the implementation of innovative, research-based approaches with effective use of ICT, which enables a personalized teaching and learning with continuous self and professional development.

2. The needs of the target group, which consists of non-teacher trained academic staff, result from the diversity of students' experiences with discipline-related aspects in the center, providing the right teaching and learning offer, based on the perspectives of independent learning, lifelong learning and the ability to study together with the students in order to continuously improve the quality of teaching and learning.

3. Effective implementation of the offered didactic framework for the assessment and development of pedagogical competence of academic staff depends on the creation of a pedagogically appropriate and supportive study environment, both online and offline, where students are encouraged through scientific coherence and generalization to solve their own disorienting dilemmas based on experience, personalized learning, effective use of ICT, freedom and diversity, where own achievements are the core perspectives of effective teaching and learning in the TDL context, and the pedagogical competence of academic staff is relocated as a priority for ensuring the effectiveness of the study process in higher education institutions.

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APPENDICES

Appendix 1

Comparative Analyses of the Future Perspectives in Higher Education

(created by researcher)

Country	Strategic Documents	Paradigm Shift	ICT/DT	LLL
LV	- Sustainable Development Strategy of Latvia until 2030 - National Development Plan of Latvia for 2021-2027	Closer link with economics and public service Quality of education	Specified in strategic documents	Specified in strategic documents
LT	- Lithuanian's Progress Strategy "LITHUANIA 2030" - 2021-2030 National Progress Program: strategic goals and tasks.	Openness Creativity Responsibility Research, technology, innovation	Smart Lithuania	Specified in strategic documents
EE	- Estonia 2035 Action Plan of the Government of the Republic and Education Strategy 2021-2035	Student-centered approach Skills-based	Digital solutions	Specified in strategic documents
DK	- Denmark's National Reform Program 2022 - Denmark's strategy for lifelong learning – Education and skills upgrading for all - Growth & Development Strategy 2016-2025.	World-class education system	Specified in strategy even in 2008	Not separately specified,
UK	- The Future of Higher Education - Higher education policy statement & reform consultation - International Education Strategy: global potential, global growth.	Global potential Excellence in teaching/learning Power of innovation and research	Support development during the whole life	Not separately specified
IE	- National Development Plan 2021-2030 - National Strategy for Higher Education to 2030.	Innovations competitiveness Continuing academic excellence	Development during the whole life	Specified in strategic documents
CA	- Strategic Plan 2022-2025 - Canada's International Education Strategy (2019-2024)	the world's top destinations for learning; skills, talents innovation capacity, global ties	Digital Operations Strategic Plan: 2021-2024	Specified in strategic documents

Appendix 2

The Regulations of Cabinet of Ministers of Republic of Latvia Nr. 129

Profesora vai asociētā profesora amata pretendenta un amatā esoša profesora vai asociētā profesora zinātniskās un pedagoģiskās kvalifikācijas vai mākslinieciskās jaunrades darba rezultātu un organizatoriskās kompetences novērtēšanas kritēriji (MK Noteikumi Nr.129)

Kritērijs	**Profesors** (ar Dr.grādu)	**Asociētais profesors** (ar Dr.grādu)	**Asociētais profesors** (profesionālais- AL 30.panta trešā daļa)
1. Zinātniskā kvalifikācija:	pozitīvs novērtējums vismaz 4 kritērijos	pozitīvs novērtējums vismaz 3 kritērijos	Nevērtē
1.1. anonīmi recenzēto zinātnisko publikāciju zinātniskajos žurnālos vai konferenču ziņojumu izdevumos, kuri indeksēti datubāzē SCOPUS vai Web of Science Core Collection vai iekļauti datubāzē ERIH+, minimālais skaits un SCOPUS vai Web of Science Core Collection datubāzē attiecīgajā Latvijas zinātnes nozarē norādītā Hirša indeksa minimums vai recenzēto zinātnisko monogrāfiju minimālais skaits	atbilstoši šī nolikuma 5. pielikumam	atbilstoši šī nolikuma 5. pielikumam	
1.2. uzstāšanās ar referātu starptautiskajās zinātniskajās konferencēs Latvijā un ārvalstīs	vismaz 5 konferencēs	vismaz 3 konferencēs	
1.3. pētniecības un attīstības projektu zinātniskā vadība vai zinātniskā līdzdalība to īstenošanā	kā zinātniskais vadītājs vai kas veic vadošā pētnieka pienākumus vismaz 1 pētniecības un attīstības projektā	kas vadošā pētnieka vai pētnieka pienākumus veic vismaz 1 pētniecības un attīstības projekta īstenošanā	
1.4. piešķirtas Latvijas Zinātnes padomes eksperta tiesības;			
1.5. promocijas darbu recenzēšana	vismaz 2 recenzēti promocijas darbi	vismaz 1 recenzēts promocijas darbs	

Appendix 2 (continuation)

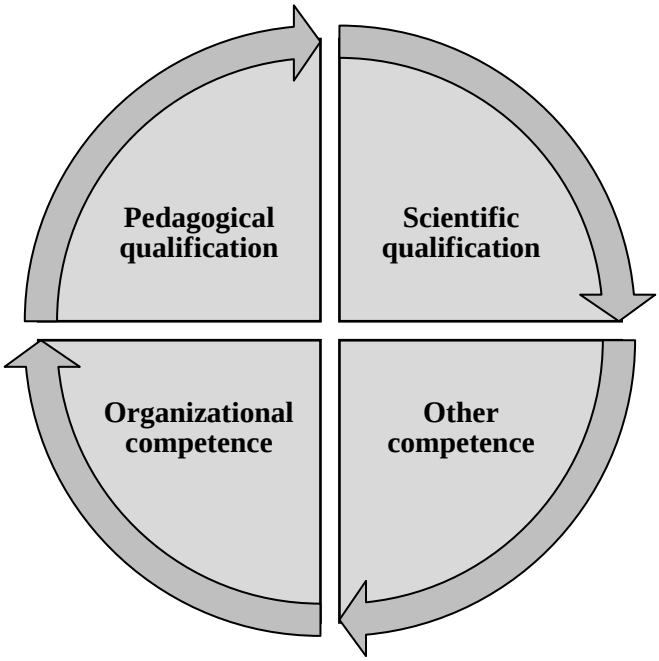
1.6. iegūtas intelektuālā īpašuma tiesības, kas saistītas, piemēram, ar izgudrojumu patentu (ieskaitot papildu aizsardzības sertifikātus zālēm un augu aizsardzības līdzekļiem), pusvadītāju izstrādājumu topogrāfiju, preču zīmi, dizainparaugu, autortiesībām vai blakustiesībām, augu šķirni, kā arī šo īpašumu tiesību atsavināšana vai licencēšana un tehnoloģiju tiesību nodošana, lai tirgū ieviestu jaunu produktu vai pakalpojumu, ņemot vērā ražošanu un pārdošanu, kas nepieciešama komerciālu panākumu sasniegšanai (komercializācija);			
1.7. zinātnisko līgumdarbu vadība vai līdzdalība to īstenošanā			
1.8. zinātniskās kvalifikācijas celšana ārvalstu augstskolās un zinātniskajās institūcijās			
2. Pedagoģiskā kvalifikācija:	pozitīvs novērtējums vismaz 4 kritērijos	pozitīvs novērtējums vismaz 3 kritērijos	pozitīvs novērtējums vismaz 2 kritērijos
2.1. doktorantu darbu vadība un aizstāvēto promocijas darbu skaits	promocijas darba vadītājs vismaz 1 promocijas darbam, par kuru ir piešķirts zinātnes doktora grāds	promocijas darba vadītājs vismaz 1 promocijas darbam	
2.2. maģistra darbu vadība un aizstāvēto maģistra darbu skaits			
2.3. nodarbību vadība **doktora** studiju programmā, izņemot ārvalstu studentus			
2.4. nodarbību vadība **maģistra** studiju programmā, izņemot ārvalstu studentus			
2.5. nodarbību vadība ārvalstu studentiem Latvijā			
2.6. nodarbību vadība ārvalstu augstskolās			
2.7. sagatavotie mācību līdzekļi, tai skaitā mācību līdzekļu nodošana publicēšanai			
2.8. pedagoģiskās kvalifikācijas paaugstināšana Latvijas un ārvalstu augstskolās vai zinātniskajās institūcijās			
3. Mākslinieciskās jaunrades darba rezultāti:			
3.1. atbilstība starptautiskai izcilībai atbilstošajā mākslinieciskās jaunrades jomā;			
3.2. ir ievērojama nozīme nacionālajā kultūrā un mākslā;			

Appendix 2 (continuation)

3.3. demonstrē starptautisku sadarbību vai iesaisti sabiedrībai nozīmīgu problēmu un jautājumu risināšanā vai aktualizācijā;			
3.4. atspoguļo spēju piedalīties, vadīt vai īstenot starptautiskus vai starptautiski finansētus mākslinieciskās jaunrades projektus;			
3.5. veicina mākslas un kultūras, mākslas izglītības vai pētniecības, tai skaitā mākslinieciskās pētniecības, norises, to popularitāti un atpazīstamību sabiedrībā			
4. Organizatoriskais darbs:	pozitīvs novērtējums vismaz 3 kritērijos	pozitīvs novērtējums vismaz 2 kritērijos	pozitīvs novērtējums vismaz 2 kritērijos
4.1. nozares profesoru padomes, promocijas padomes, augstskolas vai zinātniskās institūcijas zinātnes padomes vai tās struktūrvienības zinātniskās padomes vadība vai līdzdalība tās darbībā;			
4.2. pētniecības un attīstības projektu vadība;	projekta vadītājs vai projekta koordinators vismaz 1 pētniecības un attīstības projektam	projekta vadītājs, projekta koordinators vai projekta vadītāja asistents vismaz 1 pētniecības un attīstības projektam	
4.3. starptautisko konferenču organizācijas komitejas vadība vai līdzdalība starptautisko zinātnisko konferenču organizēšanā;			
4.4. zinātnisko izdevumu redakcijas kolēģijas vadība vai līdzdalība to darbībā vai anonīmi recenzēta zinātniskā publikācija zinātniskajā žurnālā vai konferenču ziņojumu izdevumā, zinātnisko rakstu recenzēšana izdevumos, kuri indeksēti datubāzē SCOPUS vai *Web of Science Core Collection* vai iekļauti datubāzē ERIH+;			
4.5. starptautisko zinātnisko, akadēmisko vai mākslas nozaru apvienību vadība vai līdzdalība to darbībā;			
4.6. nacionāla un starptautiska mēroga zinātnisko, akadēmisko vai mākslinieciskās jaunrades konkursu, festivālu un citu līdzvērtīgu pasākumu organizācijas komitejas vadība vai līdzdalība nacionāla un starptautiska mēroga zinātnisko, akadēmisko vai mākslinieciskās jaunrades konkursu, festivālu un citu līdzvērtīgu pasākumu organizēšanā;			

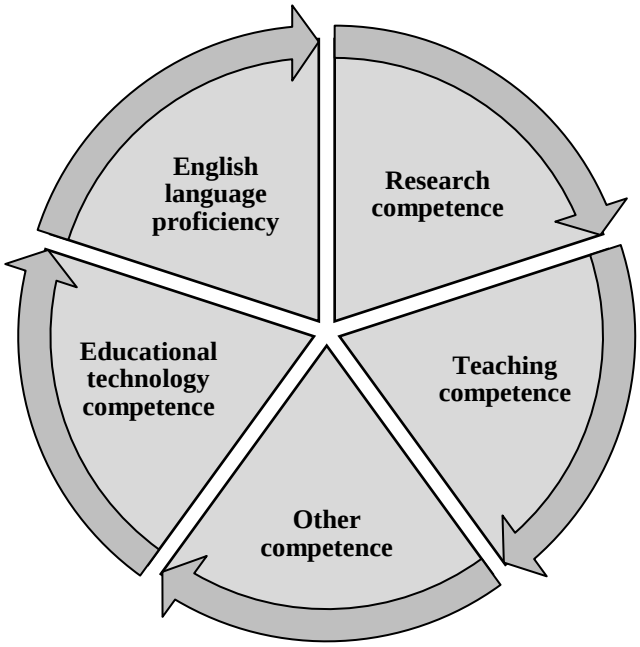
APPENDIX 3

Latvian Perspective of Pedagogical Competence (created by researcher)



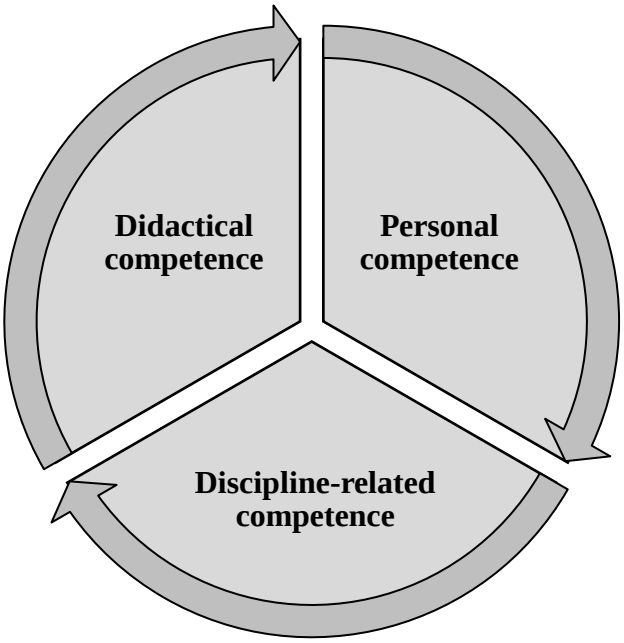
APPENDIX 4

Estonian Perspective of Pedagogical Competence (created by researcher)



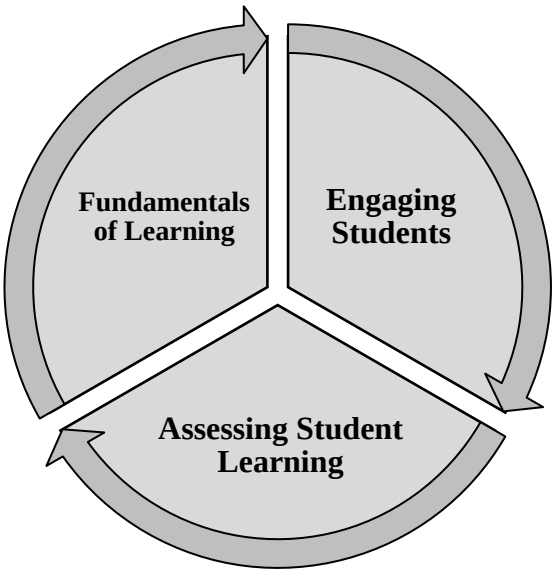
APPENDIX 5

Lithuanian Perspective of Pedagogical Competence (created by researcher)



APPENDIX 6

Canadian Perspective of Pedagogical Competence (westernU.ca, n.d.)



Perspective of Pedagogical Competence
(adopted from (westernU.ca, n.d.) researcher's concept)

Fundamentals of Learning	Engaging Students	Assessing Student Learning
Active learning: - Evidence-based approach; - Problem-based approach; - A collaborative learning environment	**building community:** - diversity of students; - personalization (individual features of students)	**Understanding of learning roles in study process**
Critical thinking: - Understanding of logical link; - Problem defining; - Argumentations, evaluation - Errors detection, compliance check; - Problem-solving	**The first lesson concept:** - Planning of study achievements; - Lecture plan; - Personalization (educators' acquaintance with classroom work and technologies)	**Assessing:** -diagnostic; - formative; - summative
High-impact practice, experience	**Large class teaching**: - team work and groups work	**Feedback and assessment tools**: - students' involvement in the assessment process

APPENDIX 7

Danish Perspective of Pedagogical Competence (Kobayashi et al, 2017)

APPENDIX 8

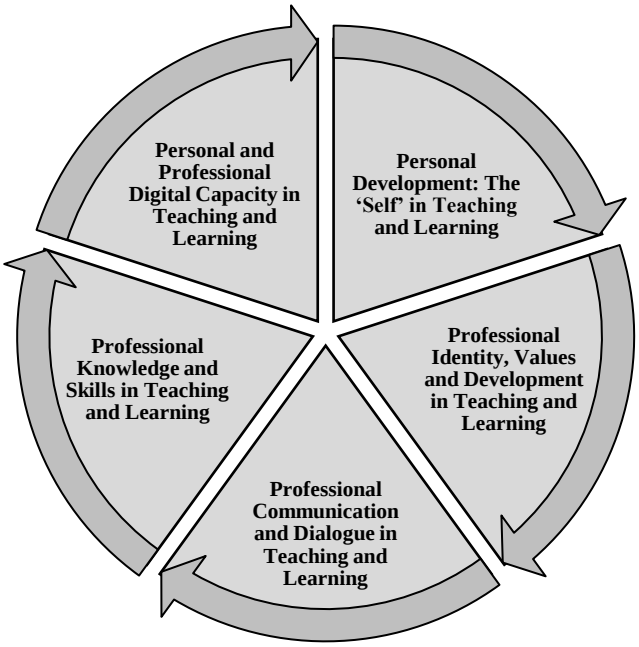
The UK Perspective of Pedagogical Competence (Advance HE, Guild HE, Universities UK, 2011)

Criteria of Pedagogical Competence in the UK Perspective
(the UK framework adopted by researcher)

Dimensions of Framework	Criteria
Core Knowledge	✓ The subject material ✓ Appropriate methods for learning, learning and assessing in the subject area and at the level of academic program ✓ How students learn, both generally and within their subject/disciplinary area(s) ✓ The use and value of appropriate learning technologies ✓ Methods for evaluating the effectiveness of teaching ✓ The implication of quality assurance and quality enhancement for academic and professional practice with a particular focus on teaching
Areas of Activity	✓ Design and plan learning activities and/or programs of study ✓ Teach and/or support learning ✓ Assess and give feedback to learners ✓ Develop effective learning environments and approaches to student support and guidance ✓ Engage in continuing professional development in subjects/disciplines and their pedagogy, incorporating research, scholarship and the evaluation of professional practices
Professional Values	✓ Respect individual learners and diverse learning communities ✓ Promote participation in higher education and equality of opportunity for learners ✓ Use evidence-informed approaches and the outcomes from research, scholarship and continuing professional development ✓ Acknowledge the wider context in which higher education operates recognizing the implications for professional practice

APPENDIX 9

Irish Perspective of Pedagogical Competence (created by researcher)



APPENDIX 10

Domains of Pedagogical Competence in Irish Perspective

(teachingandlearning.ie, 2016)

DOMAIN	DESCRIPTION
Domain 1 "Personal Development The 'Self' in Teaching and Learning"	emphasizes the personal values, perspectives and emotions that individuals bring to their teaching, including self-awareness, confidence, life experience and the affective aspects associated with teaching. It makes transparent the importance of the personal values that underpin any human interaction, especially those needed for authentic, engaged teaching and how these values are impacted by the work context.
Domain 2 " Professional Identity, Values and Development in Teaching and Learning"	emphasizes the importance of the development and self-evaluation of professional/disciplinary identity and its associated roles, responsibilities and action plans. It encourages academic staff to consider their professional and/or disciplinary identity in their context of being one of academic staff member or learning support staff who teach or other at a particular point in time. This domain supports the development of academic staff's critical reflection skills and the evaluation of their teaching. In particular, it emphasizes the importance of the development of the scholarship of teaching and learning. Some key professional values are identified. The importance of planning for professional development activities in institutional or other contexts is also highlighted as part of this domain.
Domain 3 "Professional Communication and Dialogue in Teaching and Learning"	puts special importance on the excellent, clear and coherent communication skills required for the changing learning environment. It emphasizes the key skills of written/verbal/visual communication, listening, dialogue and collaboration with others in the professional learning process. It recognizes the importance of teaching and learning in a community to enhance student learning. The social dimension of professional learning is emphasized, and it recognizes the role that communities of practice and networks play in supporting this locally, nationally and internationally; and within and across disciplines.
Domain 4 "Professional Knowledge and Skills in Teaching and Learning"	emphasizes the importance of both disciplinary knowledge and disciplinary approaches to teaching, while also drawing on inter-disciplinary experiences and approaches. It supports an active student role in the learning process, moving toward a partnership in the teaching and learning process, essential in the higher education environment. It incorporates academic staff's capacity to design and implement innovative and creative teaching and learning approaches at different levels of curriculum. The importance of assessment and feedback is emphasized, in particular the move to a more learner-oriented and dialogic feedback approach for students and balance in the assessment of/for/as learning. The role of underpinning theories of learning and academic staff's knowledge and contribution to teaching and learning policies, procedures and scholarship is also highlighted.
Domain 5 "Personal and Professional Digital Capacity in Teaching and Learning"	emphasizes the importance of personal and professional digital capacity and the application of digital skills and knowledge to professional practice. The domain focuses on the development of personal confidence in digital skills to develop professional competence and the identification of opportunities for technology to support and enhance student learning. This domain is underpinned by the National Digital Skills Framework for Education

APPENDIX 11

Digital Transformation in the Strategy of HEIs (created by researcher)

Name of HEIs	Practical Application
University of Toronto, 2019-2024 (CA)	To create study environment that foster teaching and learning, covering ICT aspect (University of Toronto, 2021)
Tallinn University of Technology 2021-2025 (EE)	Smart solutions for creating digital and climate neutral future (TalTech, 2020)
Kaunas University of Technology 2021-2025 (LT))	Development of knowledge and technologies corresponding to societal needs and their transfer to students, business and public sector (Kaunas University of Technology, 2020)
Technical University of Denmark 2020-2025 (DK)	Technologies for sustainable change; leadership of the opportunities offered by digitalization (Technical University of Denmark, n.d.)
Technological University Dublin Till 2030 (IE)	To be an agile, technology-enabled, modern university, that facilitates learners in an advanced digital world (Technological University of Dublin, n.d.)
University of Oxford 2018-2023 (UK)	To continue to invest in information technology capability to enhance the quality of research and education and to streamline administrative processes (University of Oxford, 2018)
Riga Technical University 2021-2025 (LV)	Institutional excellence through digitalization (Riga Technical University, 2020)

APPENDIX 12

QUESTIONNAIRE
ANKETA Studiju process augstākās izglītības iestādēs

Jūs esat aicināti piedalīties Rēzeknes Tehnoloģiju akadēmijas zinātniskā institūta REGI pētījumā par studiju procesa organizēšanas formām augstākās izglītības iestādēs projekta **"Transformatīvas digitālās mācīšanās ieviešana pedagoģijas zinātnes doktora programmā Latvijā (DocTransDigLearnLat)**", Nr. Lzp-2018/2-0180 ietvaros.

Nepastāv pareizas un nepareizas atbildes. Visatbilstošākā ir tā atbilde, kura Jums šķiet pareiza. Iegūtie dati ir konfidenciāli, tiks izmantoti apkopojošā veidā.

Izlasiet apgalvojumus, kas saistīti ar studiju procesa organizēšanas formām augstākās izglītības iestādēs un novērtējiet, kam Jūs vairāk piekritāt, atzīmējot attiecīgo ciparu (katrā rindā viena atbilde):

Apgalvojums A	Vairāk piekrītu apgalvojumam A				Vairāk piekrītu apgalvojumam B	**Apgalvojums B**
Sistēmatiskā, pasīva darbošanās, kas virzīta uz atmiņas attīstību	2	1	0	1	2	Radoša, aktīva darbošanās, kas virzīta uz domāšanas attīstību
Vispārīgā mācīšanās	2	1	0	1	2	Dziļa, stratēģiska, personalizēta mācīšanās
Docētāja loma – mācīt, audzināt	2	1	0	1	2	Docētāja loma – sadarboties, moderēt
Studiju procesa pamats ir šablonveida mācīšanās	2	1	0	1	2	Studiju procesa pamats ir individuālā mācīšanās
Jāspēj nodot studentiem lielu informācijas daudzumu īsa laika periodā	2	1	0	1	2	Jāspēj virzīt studentus informācijas meklēšanā un tās izmantošanā
Uz zināšanām orientēts studiju process	2	1	0	1	2	Uz personību un pieredzes veidošanu orientēts studiju process
Svarīga ir reproduktīva izglītība	2	1	0	1	2	Svarīga ir tehnoloģizācija
Jāmācās kolektīvi, frontāli	2	1	0	1	2	Jāmācās individuāli, diferencēti
Jāprot mācīt visus un visu	2	1	0	1	2	Jāprot iemācīt mācīties patstāvīgi
Mācīšanās ir dzīves nepieciešamība	2	1	0	1	2	Mācīšanas jāpārnes uz reālo dzīvi
Studiju procesā svarīgi izmantot piedāvātu mācīšanās stilu	2	1	0	1	2	Studiju procesā svarīgi izstrādāt individuālu mācīšanās stilu

Šobrīd daudz runā par **transformatīvās digitālās mācīšanos** (turpmāk TDM), jo tehnoloģiju klātbūtne pedagoģiskajos procesos izraisa būtisku studiju vides pārstrukturēšanu, veicinot dziļu, stratēģisku un personalizētu mācīšanos pedagoga un studenta sadarbības komandās, iekļaujot efektīvas tehnoloģijas apmācības metodes un uz jaunas pieredzes un vērtību veidošanās balstītu mācīšanos.

1. Kā Jūsuprāt TDM palīdz studentiem iegūt zināšanas?
_____
_____

2. Vai TDM, balstoties mācību pieredzē, nevis satura "nodošanā" ir efektīva? Pamatojiet savu atbildi.
_____
_____

3. Kādā veidā Jūsuprāt digitālā mācību (mācīšanās – mācīšana) vide ietekmē studentu un docētāju savstarpējo mijiedarbību?
_____
_____

4. Kādas Jūsuprāt sarežģītākās problēmas ir saistītas ar TDM ieviešanu?
_____
_____

5. Kādas Jūsuprāt ir TDM galvenās nākotnes perspektīvas?
_____
_____

6. Vai Jūsuprāt mūsdienu izglītības saturs, metodes, mācību procesa organizācijas formas atbilst mūsdienu digitalizētās ekonomikas apstākļiem? Kādām pārmaiņām jānotiek augstākajā izglītībā?
_____
_____

Jūsu dzimums: Vecums: _____

□ Vīrietis
□ Sieviete
□ Nevēlos norādīt

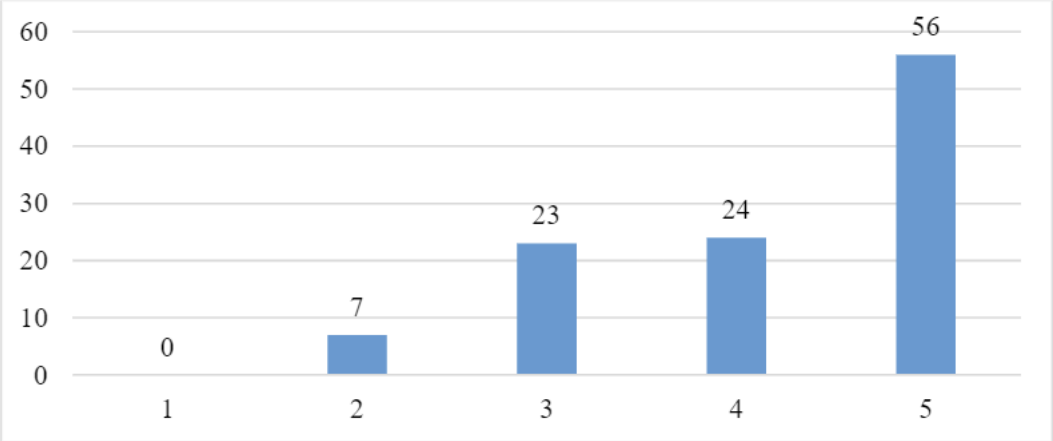
Nodarbošanās:
□ Students (norādiet studiju līmeni, Maģ., Dokt. un programmu _____)
□ Docētājs (norādiet jomu _____)

Jūsu sasaiste ar TDM:
□ Iepriekš par to neko neesmu dzirdējis/-usi
□ Esmu dzirdējis/-usi, bet neesmu praktiski pielietojis/-usi
□ Praktiski pielietoju

Paldies par veltīto laiku!

APPENDIX 13

Data Analyses for Traditional and Transformative Approach (Vindača, 2020)



APPENDIX 14

Content, Unit, Categories and Concepts, identified in the Questionnaire, Comparing Traditional and Transformative Approach (Experts' Interview) (Vindača, 2020)

Satura vienības (specifisks, konkrēts)	**Kategorija** (vispārīgāks, abstraktāks un izteikts zinātniskā valodā)	**Jēdziens** (zinātnisks, attiecināms uz teoriju)
Jautājums Nr. 1 - Kā Jūsuprāt TDM palīdz studentiem iegūt zināšanas?		
Mācīšanās notiek pieņemamā vidē, iespēja izvēlēties laiku, vietu, kvalitāti;	Mācību procesa individualizācija	**Mācību vides digitalizācija** **Mācību procesa individualizācija**
Informācijas apguve notiek ātrāk, plašāk un produktīvāk, to viegli strukturēt un integrēt, klasificēt, analizēt un sistematizēt.	Informācijas un komunikācijas tehnoloģiju kompetence	
Neierobežoti resursi, tālmācības īstenošana;	Mācību resursi, mācības e-vidē	
Svarīgi apgūt informācijas atlases un kritiskās izvērtēšanas iemaņas	Informācijas un komunikācijas tehnoloģiju kompetence	
Jautājumu Nr. 2 - Vai TDM, balstoties mācību pieredzē, nevis satura "nodošanā" ir efektīva?		
Jaunu zināšanu un prasmju attīstības īstenošana balstoties uz iepriekšējo pieredzi un tālāku pētniecisku vai praktisku darbību;	Zināšanu transformācija	**Zināšanu transformācija** **Mācību procesa individualizācija** **Mācību resursu digitalizācija** **Pieredzes transformācija**
Tiek nodrošināta individuālā pieeja mācīšanās procesā, bet svarīgi, lai students pats prastu pašvadīt mācīšanos un izdarīt izvēli par tām;	Mācību procesa individualizācija, patstāvīgas mācīšanās prasmes	
Pastāv iespēja radoši strādāt un komunicēt gan ar studentiem, gan ar docētājiem, gan Latvijas un ārvalstu pētniekiem un praktiķiem, kā arī attīstot digitālās tehnoloģijas un tehnoloģijās balstītus mācību resursus veidojas efektīva mācību pieredze starp docētājiem un studentiem;	Komunikācijas prasmes attīstība, mācību resursu digitalizācija, pieredzes transformācija	
Satura nodošana nav transformatīvā, bet teorijai jābūt cieši saistītai ar praktisko darbu.	Sasaiste starp teoriju un praksi	
Jautājums Nr. 3 - Kādā veidā Jūsuprāt digitālā mācību (mācīšanās – mācīšana) vide ietekmē studentu un docētāju savstarpējo mijiedarbību?		
Digitālā vide pastiprina šo mijiedarbību, veicina kopdarbību, ja notiek tūlītēja viedokļu apmaiņa, jēgpilna sadarbība.	Studentu – docētāju mijiedarbība	**Komunikatīvā kompetence** **IKT kompetence**
Tomēr svarīgi, ja abi studiju procesa partneri, tas ir gan students, gan docētājs ir kompetenti IT jomā.	Informācijas un komunikācijas tehnoloģiju kompetence	
Digitālā mācību vide ļauj pārvarēt attālumu, samazināt laiku, efektīvi izmantot multimodētās iespējas, tās notiek caur aktīvu mijiedarbību digitālā vidē – studijas tiešsaistē, diskusijas studiju forumos, vērtējamo darbu digitālā izpilde vai iesniegšana, vērtēšana.	Komunikācija digitālajā mācību vidē	
Digitālā komunikācija jāsabalansē ar klātienes komunikāciju, lai attīstītu arī sociālās prasmes.	Komunikatīvā kompetence	

Jautājums Nr.4 - Kādas Jūsuprāt sarežģītākās problēmas ir saistītas ar TDM ieviešanu?		
IKT darbības traucējumus, ieskaitot interneta savienojumu, kā arī studentu un docētāju kompetenču līmeni IKT jomā.	IKT, IKT kompetence	**IKT kompetence**
Daži būtiskāki ierobežojumi ir informācijas kritiskā izvērtēšana un verbālā komunikācija ar kritisko argumentāciju, kā arī iepriekšējās mācīšanās pieredzes, bailes kļūdīties.	IKT kompetence	
Jautājums Nr. 5 - Kādas Jūsuprāt ir TDM galvenās nākotnes perspektīvas?		
TDM nozīmīgums nākotnē pieaugs;	TDM	**Izglītības digitalizācija** **Mācīšanās – mācīšanas digitalizācija**
Informācijas uztveres un nodošanas transformācija;	Informatīvā kompetence	
Līdzgaitnieku platformu izveide (gan Latvijas, gan starptautiskā līmenī);	Izglītības digitalizācija	
Iespēja mācīties attālināti, mācību materiālu pieejamība; paplašinātās mācīšanās iespējas, mācīties visur un vienmēr, apgūstot arvien jaunas iespējas;	Mācīšanās – mācīšanas digitalizācija	
E-studijas attīstīsies, bet ir jāsabalansē ar praktisko darbību;	Sasaiste starp teoriju un praksi	
Jautājums Nr. 6 - Vai Jūsuprāt mūsdienu izglītības saturs, metodes, mācību procesa organizācijas formas atbilst mūsdienu digitalizētās ekonomikas apstākļiem? Kādām pārmaiņām jānotiek augstākajā izglītībā?		
Pastāv neatbilstība mūsdienu izglītības saturā, metodēs, mācību procesa organizācijās formās digitalizētās ekonomikas apstākļiem.	Didaktikas transformācija	**Didaktikas transformācija** **Augstākās izglītības iestādes digitalizācija** **IKT kompetence**
TDM ieviešanai daļa procesa jāizpilda uzņēmumos ar noteiktu, sagatavotu uzdevumu, nepieciešami speciālisti, kuri spēj iekļauties un nodot zināšanas par TDM.	Digitalizācijas stratēģija un to realizācija	
Pārmaiņas augstākajā izglītībā jāskar sekojošie aspekti: izglītības iestādes digitalizācijas; atbilstošu speciālistu piesaiste;mācību materiālu digitalizācija; digitālās kompetences attīstība un pilnveide gan studentiem, gan docētājiem.	Augstākās izglītības iestādes digitalizācija, IKT kompetence	

APPENDIX 15

SWOT Analysis of Transformative Digital Learning in Perspective of Academic Staff

(Vindača, Ļubkina, Abuže, Ušča, 2021)

STRENGTHS	WEAKNESSES
✓ Very useful experience for both educators/learners ✓ Individual approach to each learner	✓ Less quality of learning process ✓ Complicated perception of learner's emotions ✓ Low quality of communication ✓ Lack of technical aids ✓ No joint platform ✓ Lack of material ✓ No developed digital competence as for educators/ as for parents
OPPORTUNITIES	**THREATS/RISKS**
✓ To reveal strengths and weaknesses in education system ✓ New challenge as for educators as for learners ✓ Promote professional development ✓ Develop learning skills ✓ Improvement of digital skills of educator and learner ✓ Development of self-sufficiency of learners ✓ More online learning materials needed	✓ More difficult to organize the learning process ✓ Complicated perception of learner's emotions ✓ Low quality of communication ✓ Lack of technical aids ✓ Next COVID waves ✓ Uncertainties in educational policy, affecting work of educational leaders, resulting in the entire educational process

APPENDIX 16

Report Analyses following Covid-19 (Vindača, Ļubkina, 2021 b)

Name of the Report	Organization/ Time	Key findings	Methodology used
Coping with Covid-19: International higher education in Europe (Rumbley, 2020)	The European Association for International Education (EAIE), March 2020.	– the necessity of planning response plans; - information dissemination; - methods of communication; - messaging targets; - new content creation; - solutions of the impact on mobility; - long-terms concerns.	Analyses based on online survey for individuals working in HE institutions, worldwide (800 respondents).
The Impact of Covid-19 on Education Insights from Education at a Glance 2020 (Schleicher, 2020)	The Organization of Economic Cooperation and Development (OECD), May 2020	- quick replacement of face-to-face lectures with online learning; - teaching/learning and assessment process have to be updated; - impact on international students' mobility; - online platforms usage; - educators'/lecturers' preparedness to support digital learning.; - networking and social opportunities; - new educational content; - to reinvent learning environments so that digitalization expands and complements student-teacher and other relationship.	The policy responses presented in this report cover key measures announced or introduced before the end of June 2020, including the selection of main indicators for the response and potential impact from the COVID-19.
How Covid-19 has affected young universities (Recio, Colella, 2020)	Young European Research Universities (YERUN) June 2020	- blended and hybrid teaching/learning; - variety of new teaching methods; - focus will remain on face-to-face education; - alternative online assessment should be developed; - new methods of teaching, evaluation and assessment by virtual means; - the educational content with additional features; - greater emphasis on collaborative projects; - more options for students to choose; - lifelong learning; strengthen the skills of teaching and administrative staff; - to improve the quality of teaching, accessibility, digital skills, social connections, major flexibility and own learning experience.	The report includes the discussions/ roundtables with YERUN members to better understanding the impact of the crises on higher education.

Regional/ National Perspectives on the Impact of Covid-19 on Higher Education (IAU, 2020)	The International Association of Universities (IAU), July 2020	- shift to emergency remote learning; - impact on internationalization; - impact on mobility; - impact on research and the value of collaboration; - development of innovative approaches; - flexible online learning options, including blended and hybrid models; - to develop long-term strategies as respond for current challenges in 'technical infrastructure, competences, pedagogies and specific study field requirements'.	Based on the 1st IAU Global Survey, the 1st Global overview to understand the disruption caused by Covid-19 and investigate the first measures taken by HE institutions around the world. It shows the short-term effect (576 respondents).
The Global Learner Survey (Pearson, 2020)	Global learning company, Pearons, August 2020	- no return to a pre-Covid-19 education world; - trust and confidence in education system is on the rise; - learners' equality; - learners' better experience for online learning; - to build skills that will sustain people through the pandemic and beyond; - institutions feel safer at home; - total modernization of HE institutions.	Survey to measure the world in terms of "life before COVID-19 and life after" in the perspective of education. Survey respondents were selected based on their age and quality of response from leading online research panels (7038 respondents).

APPENDIX 17

PCAS Learning and Assessment Criterion in International and European Perspectives
(created by researcher)

Indicators	Canadian Perspective	Danish Perspective	The UK Perspective	Irish Perspective
1. Learning and Assessment		Knowledge of teaching and learning	Core knowledge	Personal development: teaching/ learning
1.1. Individual differences of students, personalization	Involvement of students	Personalization, responsibility	Professional values	Communication and dialogue in teaching/ learning
1.2. Goals and learning outcomes	Fundamentals of learning; Engaging	Knowledge of teaching and learning	Areas of Activity	Professional Knowledge and skills in teaching/ learning
1.3. Study course content	Fundamentals of learning; engaging	Knowledge of teaching and learning	Core knowledge	Professional Knowledge and skills in teaching/ learning
1.4. Teaching methods, models and strategies	Fundamental and active learning	Knowledge of teaching and learning	Core knowledge	Professional Knowledge and skills in teaching and learning
1.5. Effective study environment	Fundamental of learning	Practice	Area of Activity	Professional Knowledge and skills in teaching and learning
1.6. Assessment and feedback	Assessment of students learning	Knowledge sharing and peer observation	Core knowledge	Professional Knowledge and skills in teaching and learning
1.7. Reflection	Assessment of students learning	Practice and reflection	Areas of Activity	Professional Knowledge and skills in teaching and learning

PCAS Learning and Assessment Criterion in the Perspective of the Baltic States
(created by researcher)

Indicators	Estonian Perspective	Estonian Perspective	Lithuanian Perspective	Latvian Perspective
1. Learning and Assessment	Teaching competence	Teaching competence	Didactical Competence	Pedagogical qualification
1.1. Individual differences of students, personalization	Teaching competence	Teaching competence	Personal competence	Pedagogical qualification
1.2. Goals and learning outcomes	Teaching competence	Teaching competence	Discipline-related competence	Pedagogical qualification
1.3. Study course content	Teaching competence	Teaching competence	Discipline-related competence	Pedagogical qualification
1.4. Teaching methods, models and strategies	Teaching competence	Teaching competence	Didactical competence	Pedagogical qualification
1.5. Effective study environment	Teaching competence	Teaching competence	Didactical competence	Pedagogical qualification
1.6. Assessment and feedback	Teaching competence	Teaching competence	Didactical competence	Pedagogical qualification
1.7. Reflection	Teaching competence	Teaching competence	Personal competence	Pedagogical qualification

APPENDIX 18

PCAS Research-Innovative Criterion in International and European Perspectives
(created by researcher)

Indicators	Canadian Perspective	Danish Perspective	The UK Perspective	Irish Perspective
2. Research - innovative		Pedagogical development	Professional values	Personal development: teaching and learning
2.1. Professional engagements	High impact practice, experience	Knowledge sharing and peer supervision	Areas of Activity	Professional development in teaching and learning
2.2. Organizational communication	High impact practice, experience	Knowledge sharing and peer supervision	Areas of Activity	Communicatio n and dialogue in teaching and learning
2.3. Professional collaboration	High impact practice, experience	Knowledge sharing and peer supervision	Areas of Activity	Communicatio n and dialogue in teaching and learning
2.4. Reflective practice	High impact practice, experience	University pedagogy programs	Professional values	Professional development in teaching and learning
2.5. Continuous self/professiona l development	High impact practice, experience	Responsibility Ongoing development	Areas of Activity	Personal development: teaching and learning

PCAS Research-innovative Criterion in the Perspective of the Baltic States
(created by researcher)

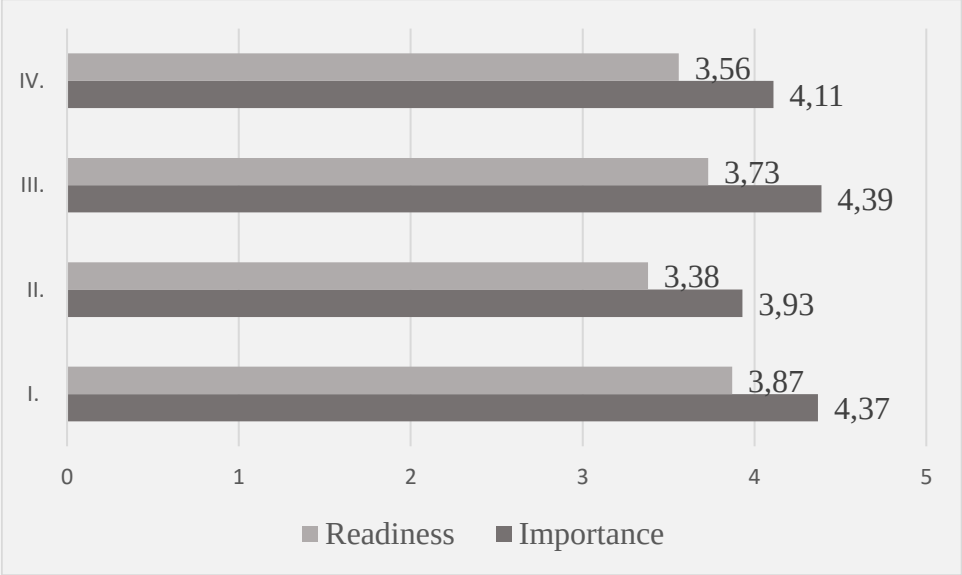
Indicators	Estonian Perspective	Estonian Perspective	Lithuanian Perspective	Latvian Perspective
2. Research - innovative	Research competence	Research competence	Not specified separately (under didactical competence and personal competence)	Scientific qualification
2.1. Professional engagements	Research competence	Research competence		Scientific qualification
2.2. Organizational communication	Research competence	Research competence		Scientific qualification
2.3. Professional collaboration	Research competence	Research competence		Scientific qualification
2.4. Reflective practice	Research competence	Research competence		Scientific qualification
2.5. Continuous self/professional development	Research competence	Research competence		Scientific qualification

APPENDIX 19

Findings of Case Study Following Covid-19 Pandemics in HEIs of Latvia

(Vindača, Ļubkina, 2021)

Aspects	Importance Index	Readiness Index	Difference
I. Study Environment	4,37	3,87	0,5
II. Organization of Study Process	3,93	3,38	0,55
III. Competences	4,39	3,73	0,66
IV.IT-Human Dialogue	4,11	3,56	0,55



APPENDIX 20

Content, Unit, Categories and Concepts, identified for the Assessment of PCAS
(data from RTU Methodological Conference, generalized by researcher)

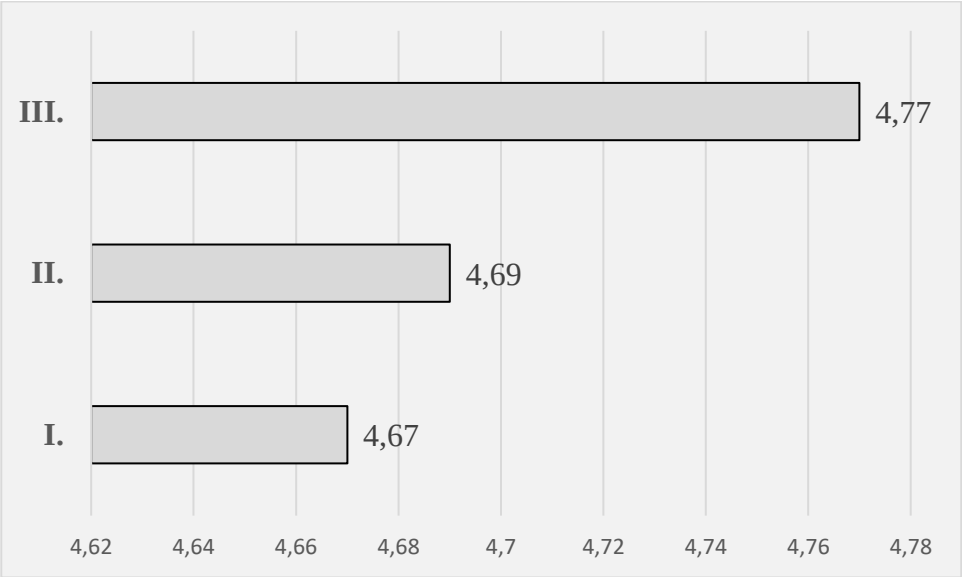
Content Unit (particular, specific)	**Category** (general, abstract and scientifically expressed)	**Concept** (scientific, applicable to the theory)
I. Group – AS Perspective		
It is clear that knowledge, experience, the ability to explain are important, but also good mood and good communication skills are very important.	Knowledge, experience, explanation skills, communication skills	**Knowledge Experience**
Professional experience	Experience	
Ability to use terms understandable to students and provide their explanations; the ability to change different types of perception during lecture – speaking, demonstration, group work, small tasks with feedbacks; the use of assessment methods of students' performance without causing conflicts	Didactics Feedback Assessment	**Feedback Assessment**
Ability to provide qualitative results.	Feedback	
Using various pedagogical methods, the ability to organize the study process in such a way as to provide useful, effective students training	Didactics Teaching/ Learning	**Didactics Teaching/ Learning**
A clear goal expressed in text format, as well as methods for achieving it. Evidence that the development and improvement of the academic staff is taking place.	Didactics Teaching/Leaning	
The most important are teaching methods and motivation of students in the study process.	Didactics Teaching/ Learning	
Clearly understandable and properly prepared teaching materials and lecture structure. Digital skills (to be able to deliver learning content using different techniques).	Didactics Digital skills	**Didactics Digital skills**
Abilities: 1) understandably and meaningfully implement the specific study course in the changed world; 2) effectively use the opportunities offered by Moodle in the study process.	Didactics Digital skills	
The ability of academic staff to formulate interesting technical problems and motivate students to solve them.	Teaching/ Learning	**Teaching/ Learning Field knowledge**
Ability to teach and learn, while maintaining interest in the field, the subject being taught.	Teaching/Leaning Field knowledge	
Broad and deep knowledge in the field of your study subject and constructive contact with students.	Field knowledge	
The desire for self-development and self-learning and the ability to combine several fields while teaching the specified subject.	Self-development Self-learning	**Self-development**
The ability to keep up with the development trends of the world in order to keep up with students	Self-development	

Interest in teaching and self-learning. Empathy. Ability to explain. Patience.	Teaching/Learning Empathy	**Attitude** **Empathy**
Empathy	Empathy	
Attitude, support, sensitivity, empathy, orientation to the solution rather than the problem, ethics.	Attitude Empathy	
Attitude towards students and studies.	Attitudes	
Educators' attitude towards the students	Attitude	
In general – if you work with open eyes and love and respect students as your own children! Take in account the suggestions of the students concerning the changes of topics etc.	Suggestions of students	**Student-centered approach**
Flexibility, a balance between wishes of students and subject requirements	Flexibility, suggestions of students	
Cooperation with the students, "hearing" the student	Cooperation	**Cooperation skills**
Cooperation and openness	Cooperation	
II. Group – Students' Perspective		
The educator's PCis the best shown by the students' acquired knowledge, their compliance with the corresponding subject level	Results/ knowledge	**Assessment** **Feedback** **Reflection**
Students' achievements in practical work	Achievements	
The actual results of the work and the assessment of students and graduates	Results of work	
Students' professional competence acquired/improved during the lecturers, practical lessons. Students' assessment both in surveys and their presence in the classes as an indicator.	Results/ competence	
Complex: 1) increase the level of knowledge of students as at the beginning of study course and at the end; 2) feedback of students; 3) the student chooses an educator as the supervisor of their scientific paper.	Results/ knowledge Attitude	
Feedback of students, long-term skills and competencies of students (surveys of graduates)	Results/ long-term skills Long-term competencies	
Growth of students	Results	
Concerning the study results, a lot depends on the students himself, including the previous knowledge	Results	
As a result, students understand the subject (can't always be evaluated with a grade), are interested in it.	Results/ understanding	
Feedback of students on the course and educator	Results	
Students' respect	Attitude	**Attitude**
The best moment occurs when students admire the academic staff for their knowledge and contribution to the work.	Attitude	
Students' attitude towards the educator	Attitude	

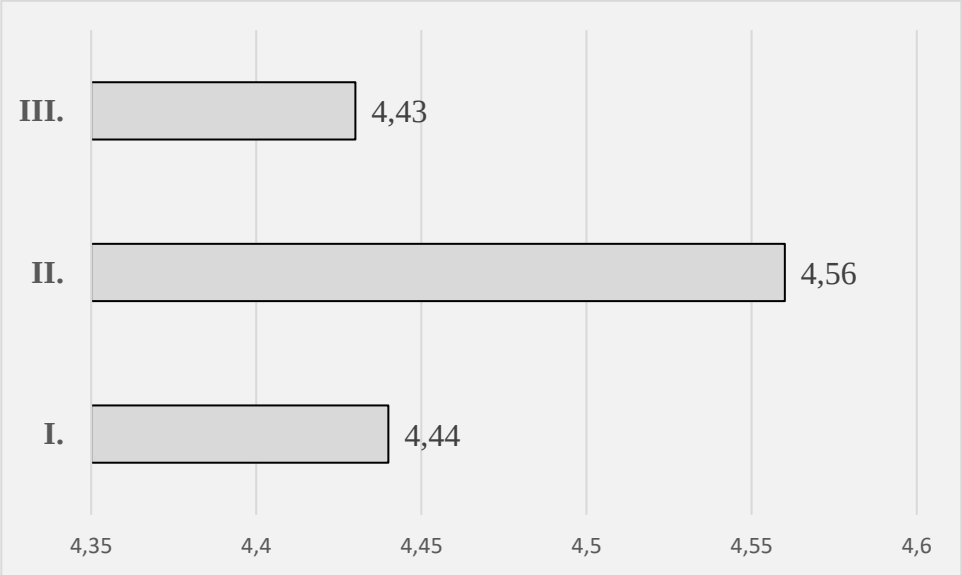
III. Group – Institutional Perspective		
Competence description, self-assessment options and systematic tests for self-assessment with the offered self-development courses at the end.	Competence description	**Essence of Competence Index of Competences**
It might look like an index that includes several competences.	Index of Competences	
First of all, it would be important to agree, at least at RTU level, what do we mean by the term competence, including pedagogical competence. Unfortunately, it currently means and describes different things.	Description of competence	
At first, it is necessary to determine the most important competences, and afterwards to look for the appropriate evaluation mechanisms.	List of competences Evaluation mechanisms	
To provide recommendations for the improvement of competences.	Improvement of Competences	
Criteria	Criteria	**Assessment System Assessment Criteria**
Measurable and clearly classified criteria.	Criteria	
Clear criteria. It is useful to find out the opinion of students as well.	Clear criteria	
To go to the heart of the matter of each representative of academic staff – there shouldn't be the same measure for all	Criteria	
Internal Quality Management	Criteria	
Comprehensible criteria covering all areas of the work of academic staff	Comprehensible criteria	
Create a system with clear/understandable criteria that will motivate academic staff to increase their pedagogical competence, instead of being just a set of formal criteria for fulfillment.	System with clear criteria	
Centralized system.	Centralized system	
The performance of academic staff can't be evaluated all over the world. It is discussed in many parts of the world – what of all work conducted by academic staff has a real impact on a student (attitude, excellent knowledge/ erudition, good leadership skills, digital skills, etc.)?	Impact Evaluation	**Assessment Evaluation Self-assessment**
Qualitative evaluation of competences – that can't be evaluated according to the usual quantitative criteria (number of supervised theses, number of supervised lecturers, etc.)	Qualitative evaluation of competences	
Attitude towards students and studies can be assessed using questionnaires.	Assessment using questionnaires	
Evaluation of the professional qualification of academic staff can only be done by another representative of academic staff.	Evaluation of professional qualification	
Self-critical assessment	Self -assessment	

APPENDIX 21

Findings of Competence Study in RTU, October 2022



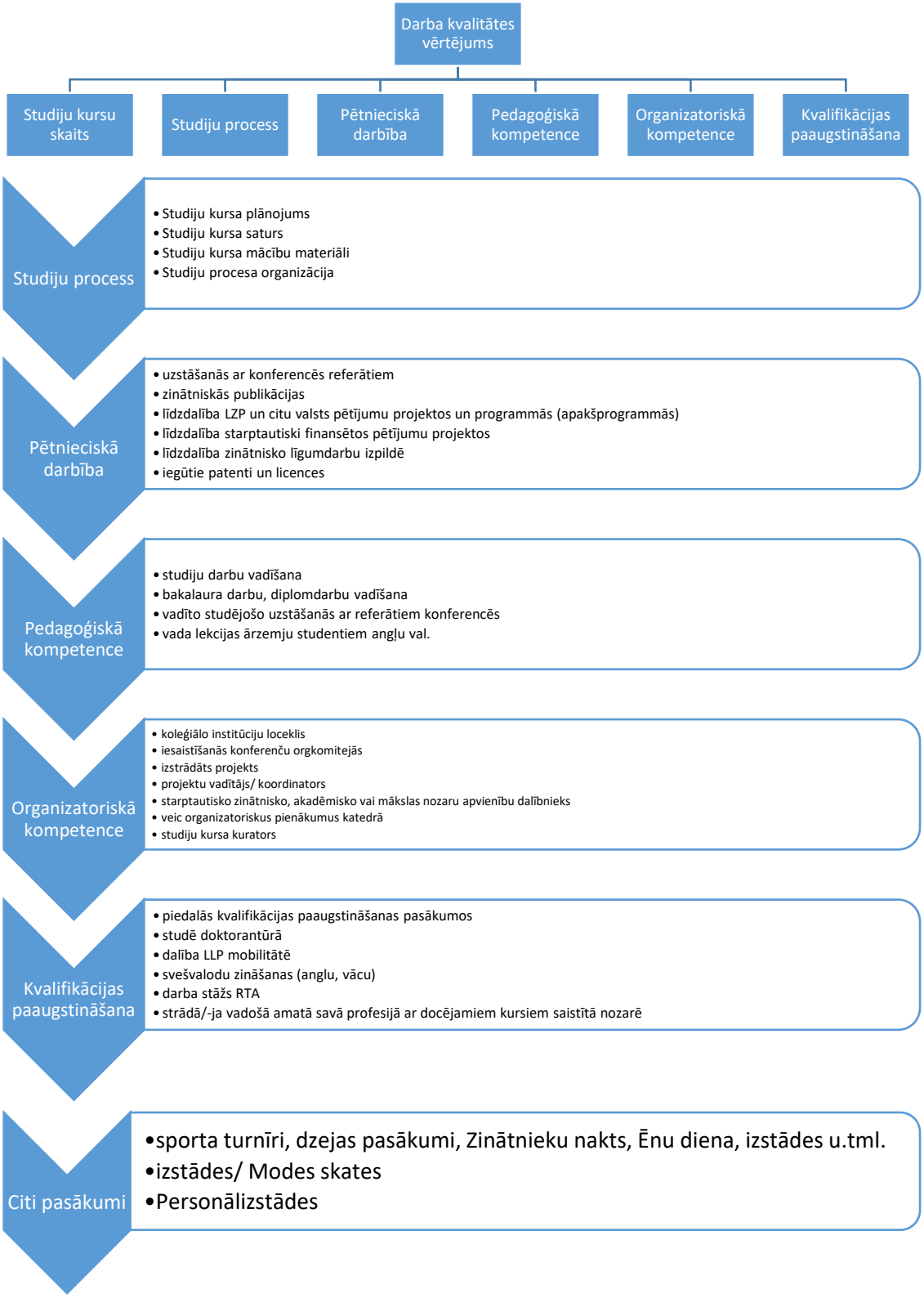
Aspect of the Use of Knowledge, Skills and ICT



Aspect of Teaching/Learning and Research

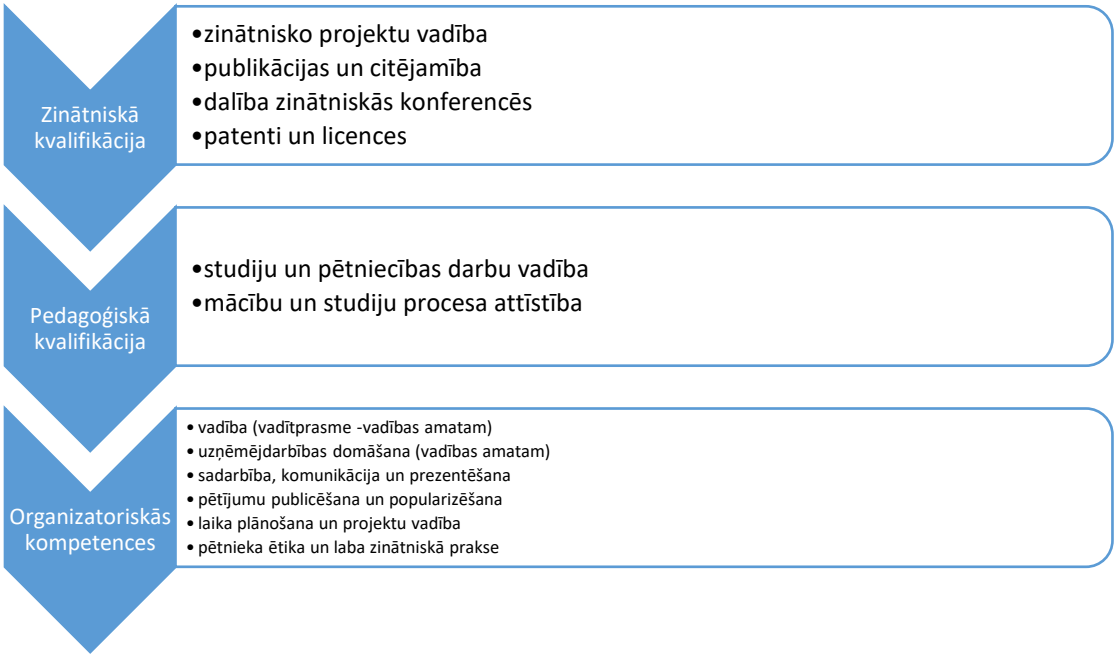
APPENDIX 22

Current Assessment System in Rezekne Academy of Technologies



APPENDIX 23

Current Assessment System in Riga Technical University



RTU

APPENDIX 24

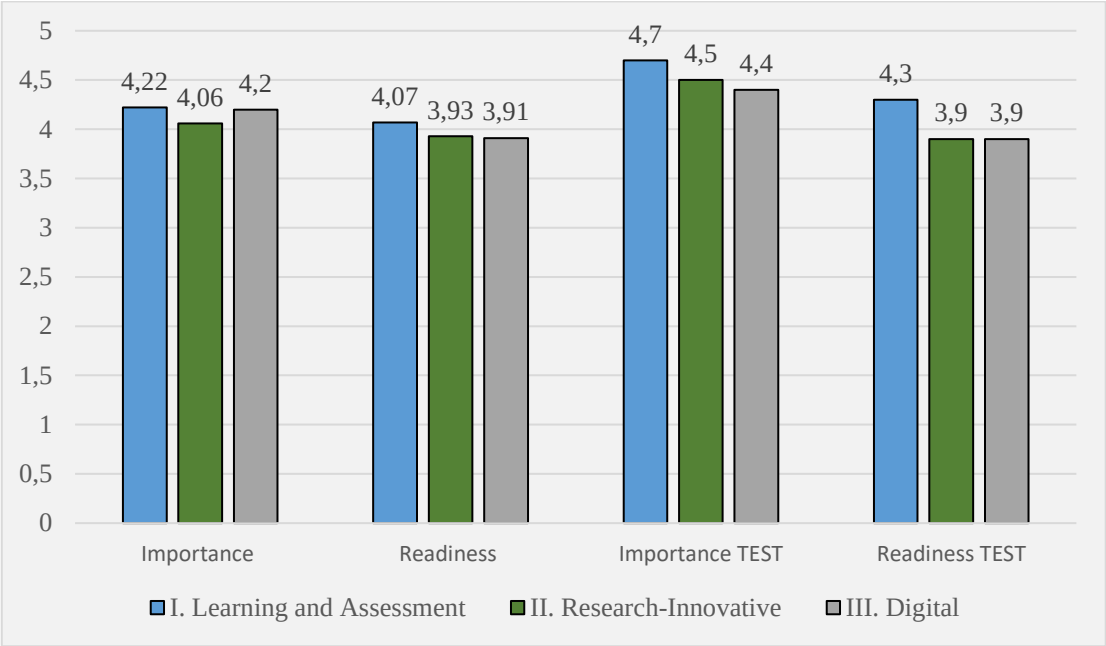
Academic Evaluation Matrix, Teaching and Development of Studies (TalTech, n.d.)

https://oigusaktid.taltech.ee/en/academic-career-management/?_ga=2.261063055.364206522.1676616568-757785811.1676616568

Teaching and development of studies[5]	Threshold for the post			• at least 5 years of experience in higher education teaching and • has completed pedagogical training in the volume of at least 12 ECTS credits	• at least 5 years of experience in teaching at different levels of higher education and • has completed pedagogical training in the volume of at least 18 ECTS credits	• at least 10 years of experience in teaching at different levels of higher education the author or compiler-editor of a textbook for higher education institutions or an equivalent teaching aid; and • during the last 5 years, has been a nominee for the Lecturer of the Year award or has received an equivalent evaluation of the quality of his/her teaching and • has completed pedagogical training in the volume of at least 24 ECTS credits
	Performance in the evaluation period	• participates in conducting I and II level studies under the supervision of a responsible academic staff member and • has received feedback on the quality of teaching and	• participates in conducting I and II level studies as the responsible lecturer and • regularly updates the study materials and	• participates in conducting I and II level studies as the responsible lecturer and • regularly updates the study materials and	• participates as a responsible academic staff member in conducting studies at different levels of higher education and • participates in or chairs graduation theses defence	• participates as a responsible academic staff member in conducting studies at different levels of higher education and • participates in or chairs graduation theses defence
		has adjusted his/her activities accordingly and • has completed pedagogical training in the volume of at least 6 ECTS credits	• the score given in feedback on teaching is at least 4 and •has completed pedagogical training in the volume of at least 6 ECTS credits and • didactic activities, incl. supporting colleagues, sharing experience in applying teaching methods *The requirement regarding the responsible academic staff member does not apply to the post of Leading Researcher.*	• the score given in feedback on teaching is at least 4 and • has completed pedagogical training in the volume of at least 6 ECTS credits and • didactic activities, incl. mentoring a colleague, sharing experience in applying teaching methods and • participates in graduation theses defence committees or • manages a study programme	committees, including at universities abroad and • delivers guest lectures at other universities and • the score given in feedback on teaching is at least 4 and •has completed pedagogical training in the volume of at least 6 ECTS credits and • didactic activities, incl. mentoring a colleague, sharing experience in applying teaching methods or • participates in programme advisory boards or manages a study programme	committees, including at universities abroad and • delivers guest lectures at other universities and • the score given in feedback on teaching is at least 4 and • has completed pedagogical training in the volume of at least 6 ECTS credits and • didactic activities, incl. mentoring a colleague, provides training to colleagues or •participates in programme advisory boards or manages a study programme or fulfils educational administrative responsibilities at least at the school level

APPENDIX 25

Comparison of Self-assessment and TEST Questionnaires



APPENDIX 26

Evaluation Matrix of Open-Lecture, RTU

Atvērtās lekcijas vērtēšanas kritēriji asociēto profesoru un profesoru vēlēšanām RTU

3 = augsts vērtējums 2 = pietiekams 1 = nepietiekams

Izvēlieties vienu no vērtējumiem, kurš visvairāk atbilst pretendenta sniegumam *un apvelciet ar aplīti*

Kritēriji	Rādītāji	Vērt.	Vērtētāja komentāri/pamatojums
1.Mērķis un studiju rezultāti	Skaidra lekcijas struktūra, kurai: 1.1.Mērķis formulēts un virzīts uz sasniegumiem 1.2. Skaidri pamatoti sasniedzamie studiju rezultāti (formulēti uzdevumi mērķa sasniegšanai)	1-2-3 1-2-3	1.1. _____ 1.2. _____
2. Studējošo dažādība/ īpatnības	2.1. Studējošo individuālās īpatnības ņemtas vērā (piemērots temps; speciālās vajadzības, kultūru atšķirības, u.c) 2.2. Notiek mijiedarbība (sagatavoti jautājumi diskusijai un uzdevumi studentiem) nodrošinot pozitīvu studiju vidi	1-2-3 1-2-3	1.1. _____ 1.2. _____
3. Nodarbības saturs	3.1. Saturs atbilst izvirzītajam mērķim (un lekcijas tēmai/prezentācijas nosaukumam) un studējošo vajadzībām (izstrādāti materiāli dažādiem studējošo zināšanu līmeņiem) 3.2. Saturs sekmē studējošā pētnieciski-inovatīvās kompetences attīstīšanu un nodrošina pētniecisko darbību attīstošu vidi	1-2-3 1-2-3	1.1. _____ 1.2. _____
4. Efektīva studiju /e-studiju vide un IT izmantošana	4.1. Mācībspēks demonstrē profesionālās (savas nozares) zināšanas, kuras veiksmīgi transformētas efektīva studiju/e-studiju procesa organizēšanai (skaidrs izklāsts, veicina studējošo radošumu, sekmē student-centrētu mācīšanos, u.c.) 4.2. IT un dažādu platformu izmantošana nodrošina efektīvu e-komunikāciju (līdzās būšanas princips, personalizācijas princips, u.c.)	1-2-3 1-2-3	1.1. _____ 1.2. _____
5. Mācīšanas metodes, modeļi, stratēģijas	5.1. Satura īstenošanai izmantotas atbilstošas mācību metodes (kā problēmbalstīta mācīšanās, kritiskās domāšanas elementi u.c.), mācību līdzekļi (tehnika, nodrošinājums, u.c.), nodrošinot efektīvu studiju/ e-studiju vidi	1-2-3	1.1. _____
6. Novērtēšana un atgriezeniskā saite	6.1. Skaidri izstrādāti vērtēšanas kritēriji sasniegumu novērtēšanai un studējošie ar tiem iepazīstināti nodarbības sākumā, tiek ņemts vērā arī studējošā pašvērtējums	1-2-3	1.1. _____
7. Mācībspēka atbildes uz precizējošiem jautājumiem		1-2-3	

Kopsavilkums_____

_____

APPENDIX 27

Findings of Final Questionnaire, % form AS Perspective

Criteria/Indicator	Never 1	Ever 2	Sometimes 3	Often 4	Always 5
I. Teaching/Learning and Assessment					
1.1. Individual differences of students, personalization	2 (2%)	15 (17%)	26 (30%)	35 (40%)	9 (11%)
1.2. Goals and learning outcomes	1 (1%)	4 (5%)	18 (20%)	33 (38%)	31 (36%)
1.3. Study course content	0	2 (2%)	14 (16%)	35 (40%)	36 (42%)
1.4. Teaching methods, models and strategies	1 (1%)	5 (6%)	23 (26%)	39 (45%)	19 (22%)
1.5. Study environment	1 (1%)	5 (6%)	17 (19%)	46 (55%)	17 (19%)
1.6. Assessment and feedback	2 (2%)	8 (9%)	14 (16%)	27 (31%)	36 (42%)
1.7. Reflection	3 (4%)	4 (5%)	37 (42%)	29 (33%)	14 (16%)
II. Research – innovative					
2.1. Professional engagements	1 (1%)	10 (11%)	22 (25%)	40 (47%)	14 (16%)
2.2. Organizational communication	1 (1%)	10 (11%)	27 (31%)	24 (28%)	25 (29%)
2.3. Professional collaboration	2 (2%)	7 (8%)	26 (30%)	32 (37%)	20 (23%)
2.4. Reflective practice	2 (2%)	6 (7%)	26 (30%)	36 (42%)	17 (19%)
2.5. Continuous self/professional development	1 (1%)	6 (7%)	19 (22%)	28 (32%)	33 (38%)
III. Digital					
3.1. Selection of digital resources	0	3 (4%)	22 (25%)	29 (33%)	33 (38%)
3.2. Creation and modification of digital resources	1 (1%)	13 (15%)	25 (29%)	29 (33%)	19 (22%)
3.3. Management, protection and sharing of digital resources	0	10 (11%)	26 (31%)	34 (39%)	17 (19%)
3.4. Empowering learners for effective use of ICT	3 (4%)	7 (8%)	25 (29%)	34 (39%)	18 (20%)
3.5. Facilitating learner's digital competence	2 (2%)	8 (9%)	26 (31%)	33 (38%)	18 (20%)

APPENDIX 28

Kruskal Wallis Test (HEIs) for All Indicators

	1.1. Individual differences of students, personalization	1.2. Goals and learning outcomes	1.3. Appropriate study course content	1.4. Appropriate teaching methods, models and strategies	1.5. Effective study environment
Kruskal-Wallis H	2,315	8,015	6,907	9,623	1,142
df	2	2	2	2	2
Asymp. Sig.	,314	,018	,032	,008	,565

	1.6. Assessment and feedback	1.7. Reflection	2.1. Professional engagements	2.2. Organizational communication	2.3. Professional collaboration
Kruskal-Wallis H	6,599	3,909	1,290	1,588	3,810
df	2	2	2	2	2
Asymp. Sig.	,037	,142	,525	,452	,149

	2.4. Reflective practice	2.5. Continuous self/professional development	3.1. Selection of digital resources	3.2. Creation and modification of digital resources	3.3. Management, protection and sharing of digital resources
Kruskal-Wallis H	2,043	15,408	15,486	12,500	6,332
df	2	2	2	2	2
Asymp. Sig.	,360	,000	,000	,002	,042

	3.4. Empowering learners for effective use of ICT	3.5. Facilitating learner's digital competence
Kruskal-Wallis H	2,449	1,995
df	2	2
Asymp. Sig.	,294	,369

APPENDIX 29

Mann-Whitney Test by Country (Three Criteria)

Ranks

	Country (Valsts)	N	Mean Rank	Sum of Ranks
R1	1	73	42,01	3108,50
	2	14	55,35	719,50
	Total	87		
R2	1	73	42,62	3154,00
	2	14	51,85	674,00
	Total	87		
R3	1	73	41,99	3107,50
	2	14	55,42	720,50
	Total	87		

Test Statistics[a]

	R1	R2	R3
Mann-Whitney U	333,500	379,000	332,500
Wilcoxon W	3108,500	3154,000	3107,500
Z	-1,761	-1,220	-1,774
Asymp. Sig. (2-tailed)	,078	,222	,076

APPENDIX 30

Mann-Whitney Test by Country (Indicators)

	1.1. Individual differences of students, personalization	1.2. Goals and learning outcomes	1.3. Appropriate study course content	1.4. Appropriate teaching methods, models and strategies
Mann-Whitney U	457,500	245,000	327,000	364,000
Wilcoxon W	548,500	3020,000	3102,000	3139,000
Z	-,295	-2,976	-1,977	-1,484
Asymp. Sig. (2-tailed)	,768	,003	,048	,138

	1.5. Effective study environment	1.6. Assessment and feedback	1.7. Reflection	2.1. Professional engagements
Mann-Whitney U	435,500	338,500	363,500	432,500
Wilcoxon W	3210,500	3113,500	3138,500	523,500
Z	-,592	-1,794	-1,490	-,615
Asymp. Sig. (2-tailed)	,554	,073	,136	,538

	2.2. Organizational communication	2.3. Professional collaboration	2.4. Reflective practice	2.5. Continuous self/professional development
Mann-Whitney U	474,000	412,500	317,500	221,500
Wilcoxon W	3249,000	3187,500	3092,500	2996,500
Z	-,087	-,854	-2,058	-3,254
Asymp. Sig. (2-tailed)	,931	,393	,040	,001

	3.1. Selection of digital resources	3.2. Creation and modification of digital resources	3.3. Management, protection and sharing of digital resources	3.4. Empowering learners for effective use of ICT
Mann-Whitney U	130,000	345,000	450,500	403,500
Wilcoxon W	2905,000	3120,000	3225,500	3178,500
Z	-4,424	-1,683	-,382	-,969
Asymp. Sig. (2-tailed)	,000	,092	,703	,333

APPENDIX 31

Mann-Whitney Test, Mean Rank by Country (Indicators)

	Country (Valsts)	N	Mean Rank	Sum of Ranks
1.1. Individual differences of students, personalization	1	73	44,32	3279,50
	2	14	42,19	548,50
	Total	87		
1.2. Goals and learning outcomes	1	73	40,81	3020,00
	2	14	62,15	808,00
	Total	87		
1.3. Appropriate study course content	1	73	41,92	3102,00
	2	14	55,85	726,00
	Total	87		
1.4. Appropriate teaching methods, models and strategies	1	73	42,42	3139,00
	2	14	53,00	689,00
	Total	87		
1.5. Effective study environment	1	73	43,39	3210,50
	2	14	47,50	617,50
	Total	87		
1.6. Assessment and feedback	1	73	42,07	3113,50
	2	14	54,96	714,50
	Total	87		
1.7. Reflection	1	74	42,41	3138,50
	2	13	53,04	689,50
	Total	87		
2.1. Professional engagements	1	73	44,66	3304,50
	2	14	40,27	523,50
	Total	87		
2.2. Organizational communication	1	73	43,91	3249,00
	2	14	44,54	579,00
	Total	87		
2.3. Professional collaboration	1	73	43,07	3187,50
	2	14	49,27	640,50
	Total	87		
2.4. Reflective practice	1	73	41,79	3092,50
	2	14	56,58	735,50
	Total	87		
2.5. Continuous self/professional development	1	73	40,49	2996,50
	2	14	63,96	831,50
	Total	87		
3.1. Selection of digital resources	1	73	39,26	2905,00
	2	14	71,00	923,00
	Total	87		
3.2. Creation and modification of digital resources	1	73	42,16	3120,00
	2	14	54,46	708,00
	Total	87		
3.3. Management, protection and sharing of digital resources	1	73	43,59	3225,50
	2	14	46,35	602,50
	Total	87		
3.4. Empowering learners for effective use of ICT	1	73	42,95	3178,50
	2	14	49,96	649,50
	Total	87		
3.5. Facilitating learner's digital competence	1	73	43,27	3202,00
	2	14	48,15	626,00
	Total	87		

APPENDIX 32

Content, Unit, Categories and Concepts, identified for Learning and Assessment (AS)

(created by researcher)

Content Unit (particular, specific)	**Category** (general, abstract and scientifically expressed)	**Concept** (scientific, applicable to the theory)
I. Learning and Assessment		
Motivation of students and AS	Motivation	**Motivation, Engagement**
Self-driven education, engagement	Engagement	
Engagement, use of knowledge in certain situations	Engagement	
Continuous development	Continuous development	**Continuous development**
Participation in different training for the development of pedagogical competence	Development of pedagogical competence	
Continuous development	Continuous development	
Development	Development	
Assessment criteria	Assessment	**Assessment, self-assessment**
Self-assessment	Self-assessment	
Assessment process	Assessment	
Critical thinking	Critical thinking	**Critical thinking Communication Knowledge, skills**
Communicative competence of students, write more than speak	Communication	
For foreign students – the knowledge of language, other culture, communication features	Knowledge	
Knowledge, skills to use them	Knowledge, skills	
Communication	Communication	
Student-centered approach	Student-centered approach	**Student-centered approach**
Individualization of the study process	Individualization	
Student-centered approach	Student -centered approach	

APPENDIX 32 (continuation)

Content, Unit, Categories and Concepts, identified for Research -Innovative (AS)

(created by researcher)

Content Unit (particular, specific)	**Category** (general, abstract and scientifically expressed)	**Concept** (scientific, applicable to the theory)
II. Research-Innovative		
Encourage for search of information	Encourage students	**Scientific research Participation in projects h-index Networking Encouragement**
h-index, the participation in scientific projects	h-index, participation in scientific projects	
Planning competence – before starting work, to be able to lay out the steps and actions for achieving the goals	Planning competence	
Paying attention to the details	Details	
It mostly depends on the level of the course. For bachelor courses – not so important.	Level of studies	
Regular participation in scientific projects	Participation in scientific projects	
New scientifically-research methods, for example, in questionnaires, data processing and analyses, modelling	New scientifically-research methods	
Networking	Networking	
The results of the research	The results of the research	
best practices used in teaching	best practices used in teaching	**Research-based teaching/learning**
from learning perspective more	learning perspective	
to teaching-learning process	to teaching-learning process	
for teaching-learning	for teaching-learning	
research-based teaching/learning	research-based teaching/learning	
Critical thinking	Critical thinking	**Teaching/learning Innovations Creativity Evidence-based approach Critical thinking**
updated trends, innovations	updated trends, innovations	
innovations	innovations	
creativity	creativity	
evidence-based approach	evidence-based approach	
Innovations	Innovations	
Creativity	Creativity	

APPENDIX 32 (continuation)

Content, Unit, Categories and Concepts, identified for Digital (AS)
(created by researcher)

Content Unit (particular, specific)	**Category** (general, abstract and scientifically expressed)	**Concept** (scientific, applicable to the theory)
III. Digital		
continuous development in digital field	Continuous development	**Self-assessment Continuous development**
Regular improvement and development	Improvement/ development	
continuous development	continuous development	
I think student and teacher already at the high level of DigComp.	DigComp	
Self-assessment tool	Self-assessment tool	
Promotion of students' digital competence	Digital competence	**Digital Competence Communication Critical thinking**
facilitating digital competence for effective learning	facilitating digital competence	
Critical thinking	Critical thinking	
Communication and cooperation	Communication cooperation	
from learning perspective more	from learning perspective	**Teaching/Learning**
to teaching-learning process	to teaching-learning process	
from learning perspective more	from learning perspective more	
to teaching-learning process	to teaching-learning	
new digital tools and apps	new digital tools and apps	**ICT Safety Updating**
Use of ICT at lecturers, search of information, processing of information	Use of ICT, information management	
Exploring new ways all the time	New ways	
Familiarity with the latest programs and tools for data analysis	Updated programs, tools	
Skills of ICT use	Skills of ICT use	
New digital tools and apps	New digital tools and apps	
safety, problem solving	safety, problem solving	
safety	safety	

APPENDIX 33

Content, Unit, Categories and Concepts, identified for Learning and Assessment
Students' Perspective (created by researcher)

Content Unit (particular, specific)	**Category** (general, abstract and scientifically expressed)	**Concept** (scientific, applicable to the theory)
I. Learning and Assessment		
Engagement of students	Engagement of students	**Engagement** **Motivation** **Interest**
Engagement	Engagement	
students' involvement, engagement	students' involvement, engagement	
Motivation for the active communication between the academic staff and students	Motivation, communication	
Academic staff motivate students for self-development, encourage to follow and research the new scientific papers about the study topics and themes	Motivation and encouragement of students for research	
The ability to arouse the interest	The ability to arouse the interest	
Total evaluate as good	Evaluation - good	**Evaluation**
Total evaluation is 3/5	Evaluation -3/5	
Total evaluation is 2	Evaluation – 2	
Total evaluation is ok	Evaluation -ok	
Totally evaluate the competence of academic staff as average	Evaluation -average	
To present the results of the questionnaires	Feedback from questionnaires	**Feedback, Reflection**
Feedback from the academic staff, clear understanding of the activities schedule and assessment procedure	Feedback, clear explanation of the process	
To provide analyses after the conducted tests/exams, written papers	Feedback provision	
Feedback, reflection, communication at the level of students	Feedback, reflection, communication	

Content, Unit, Categories and Concepts, identified for Research-Innovative
Students' Perspective (created by researcher)

Content Unit (particular, specific)	**Category** (general, abstract and scientifically expressed)	**Concept** (scientific, applicable to the theory)
II. Research-Innovative		
Experience sharing	Experience sharing	**Experience sharing Real life examples**
Providing real life examples, offering additional knowledge, besides the program content	Real life examples Additional knowledge	
There should be more practice rather than theory in my opinion	More practice	
The knowledge of academic staff, real life examples, for better understanding of the topic	Knowledge of AS, real life examples	
Continuous development of academic staff	Continuous development	**Continuous development Knowledge, skills, comprehension Cooperation**
Self-initiative, cooperation	Self-initiative, cooperation	
previous knowledge	previous knowledge	
Comprehension	Comprehension	
mid-range, easy to understand but need high concentration	Understanding with high concentration	
Constantly observation	Constantly observation	**Organization of study process Supply, norms Observation**
Structured study course, following step-by-step principle	Structured study course	
Provision of ICT, material	Supply	
Learning/teaching in accordance to the requirements, aims and goals	Clear requirements of Learning/teaching	
Range of norms is clear and understandable	Range of norms	
group works, self-study abilities	Group-work, self-study	**Teaching/Learning Creativity Innovations Different methods/approaches**
teaching aspect	Teaching aspect	
Interest in the work; learning opportunities	Learning opportunity, interest	
Creativity	Creativity	
Innovations	Innovations	
Creativity	Creativity	
Teaching	Teaching	
choice of methods	choice of methods	
The diversity of the activities during the study course	Diversity of activities	
To learn from each other during the lecture	Learning from each other	
Outdated teaching methodology	Outdated teaching methodology	
Search of information and its processing, creative approach in activities	Creativity	

Content, Unit, Categories and Concepts, identified for Research-Innovative
Students' Perspective (created by researcher)

Content Unit (particular, specific)	**Category** (general, abstract and scientifically expressed)	**Concept** (scientific, applicable to the theory)
II. Research-Innovative		
To stimulate research of new, unusual topics, themes	Stimulation of research	**Research-innovative projects** **Practical experience** **Availability of scientific-research opportunities**
The offered list of research opportunities	Research opportunities	
To provide not only sources of information, but also personal contacts of person, to whom it will be possible to consult with in the specified field	Personal contacts Research – innovative projects	
use of university's facilities, laboratories; research-innovative projects during studies	Research-innovative projects	
To emphasize the experience gaining during the practical work, but not the calculations and formation	Experience from practical work	
To evaluate the necessity of developing the practical research work	Practical research work	
Availability of scientific works	Availability of scientific works	
Active participation in practice	Active participation in practice	**Active practice** **Collaboration** **Communication** **Interaction**
Active practice	Active practice	
To involve students into the research	Students involvement into research	
If the academic staff see the potential of the student, they will invite to work in collaboration in laboratories or research	Invite students for collaboration	
Cooperation with factories and defining new technologies onside	Cooperation with the industry	
Interaction	Interaction	
In total satisfaction	Satisfaction	**Creativity** **Professionalism** **Satisfaction** **Motivation** **Innovations**
Creativity	Creativity	
Creativity, entrepreneurial	Creativity, entrepreneurial	
Motivation	Motivation	
professional, dedicated	Professionalism	
Creativity	Creativity	
Innovations	Innovations	
Creativity	Creativity	
Creativity	Creativity	

APPENDIX 33 (continuation)

Content, Unit, Categories and Concepts, identified for Research-Innovative
Students' Perspective (created by researcher)

Content Unit (particular, specific)	**Category** (general, abstract and scientifically expressed)	**Concept** (scientific, applicable to the theory)
II. Research-Innovative		
Gained experience by developing as scientific papers, as scientific work	Gained experience from scientific papers and work	**Real life examples**
Real life examples	Real life examples	
Too old offered activities, especially for work in laboratories	Updated tools	**Modernization** **Innovation** **Update**
Follow up the actualities in the field	Follow up the actualities in the field	
Update the opportunities and importance of research activities	Update the opportunities and importance of research activities	
Modernization	Modernization	
Efficiency	Efficiency	**Teaching/Learning** **Study environment** **Methods, approaches** **Assessment system**
The unique system of criteria for research work	The unique system of criteria for research work	
Mastery, the variety of choices	Mastery, the variety of choices	
The need to provide the necessary materials	The need to provide the necessary materials	
The range of norms	The range of norms	
To provide the necessary information	To provide the necessary information	
Accurate and positive study environment	Accurate and positive study environment	

APPENDIX 33 (continuation)

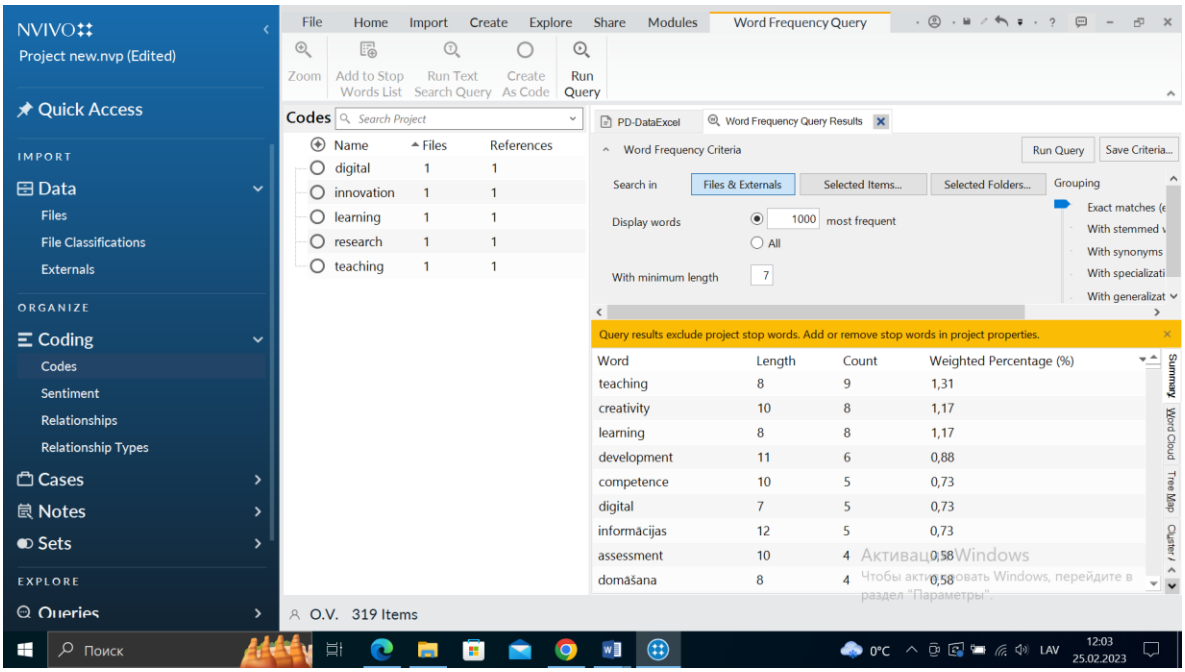
Content, Unit, Categories and Concepts, identified for Digital
Students' Perspective (created by researcher)

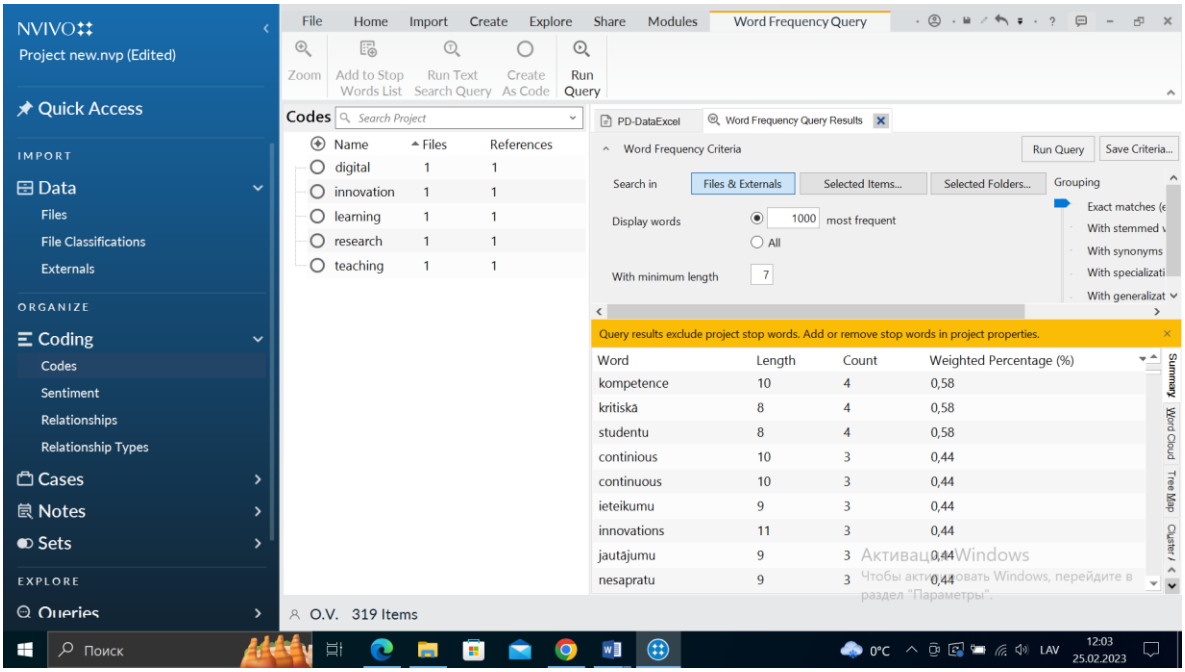
Content Unit (particular, specific)	**Category** (general, abstract and scientifically expressed)	**Concept** (scientific, applicable to the theory)
III. Digital		
Total level is average	Total level is average	**Evaluation**
High level	High level	
Total evaluation 2/5	Total evaluation - 2/5	
Total evaluation 2	Total evaluation - 2	
Level is higher than in other higher education institutions	High level than in other higher education institutions	
digital proficiency of university stuff, availability of "online class/study room" facilities	digital proficiency	**Digital Competence** **Digital Communication** **Digital creativity**
Safety	Safety	
AI	AI	
Online teaching and learning	Online teaching and learning	
Skillful digital communication with students	Skillful digital communication	
Creative approach for information search, processing and presentation	Creative approach for information management	
Guidance	Guidance	**Teaching/Learning** **Study environment** **Digital approaches** **Range of norms**
Implementation of new solutions, tendencies, interactive, online	Implementation of new solutions, tendencies, interactive, online	
The range of norms	The range of norms	
The variety of ICT methods, innovations, active use/apply	The variety of ICT use	
Comfort, informative environment	Comfort, informative environment	

Content, Unit, Categories and Concepts, identified for Digital
Students' Perspective (created by researcher)

Content Unit (particular, specific)	**Category** (general, abstract and scientifically expressed)	**Concept** (scientific, applicable to the theory)
III. Digital		
Critical thinking	Critical thinking	**Knowledge sharing** **Continuous development** **Flexibility** **Creativity** **Critical thinking** **Professionalism**
Maybe they know a lot, but they do not know how to share they knowledge	Knowledge sharing	
continuous development	continuous development	
Flexibility	Flexibility	
Creativity	Creativity	
Creativity	Creativity	
active use	active use	
Professionalism	Professionalism	
Material provision/ supply	Material provision/ supply	**ICT** **Availability** **Effective application**
Availability of technologies	Availability of technologies	
Management of programs used in the industry	Management of programs used in the industry	
Easy to access different digital tools as a student	Access to digital tools	
Access to powerful computers with different functions	Access to powerful computers with different functions	
Effective use of qualitative digital cognitive resources	Effective use of qualitative digital cognitive resources	
Diversity	Diversity	
Tools	Tools	
To place the video of specified topics in ortus, the recording of lecture/discourse from previous, it will be helpful to understand the theme/topics	Material placement in ORTUS	
Effective placement of study course in ortus	Effective placement of study course in ORTUS	
To see the marks in ortus	ORTUS	
Ability to use and manage at least one digital platform	digital platform management	
Easy accessibility and useful interfaces	Easy accessibility and useful interfaces	

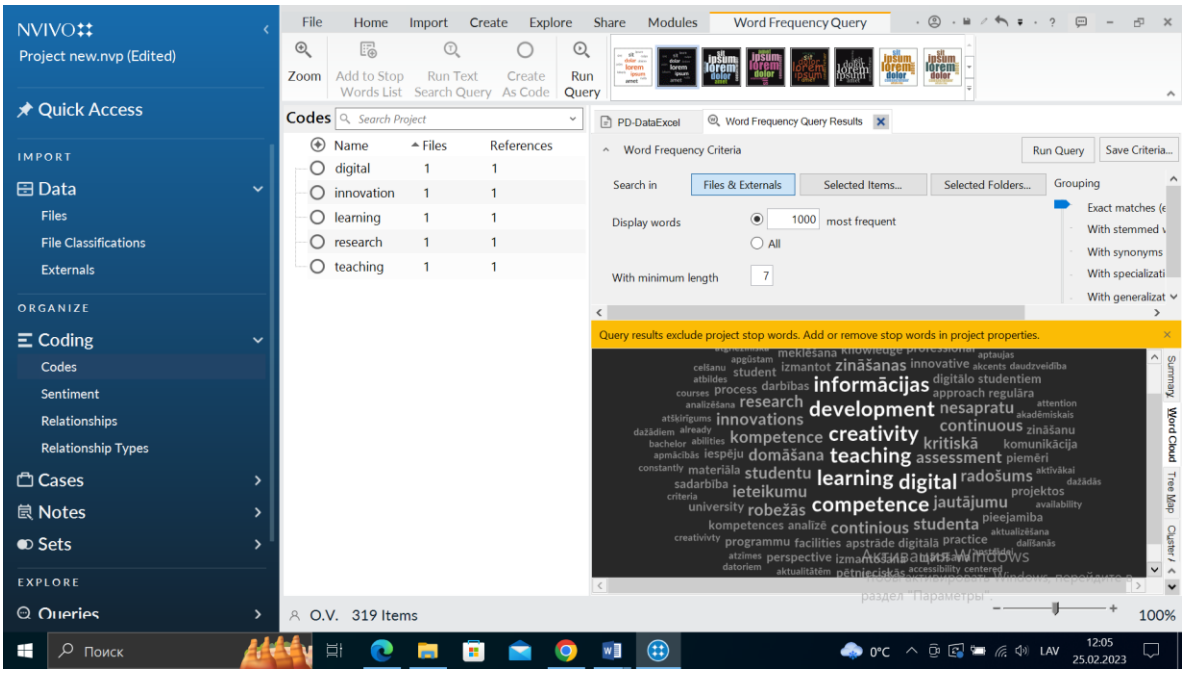
Word Frequency Query Results, using NVivo software





APPENDIX 35

Word Cloud, using NVivo software



APPENDIX 36

QUESTIONNAIRE

Mastery Level Evaluation of Pedagogical Competence of Academic Staff (designed within the research of PhD Thesis)

The data obtained is confidential and will be used in an aggregate manner.
Please choose the option that best reflects your current practice (only one option is possible for each statement).

I. Teaching/Learning and Assessment Criteria
1.1. Individual differences of students, personalization: a) All students are required to do the same activities; b) Optional activities for those advance or lagging behind are provided. c) Whenever possible, information and communication technologies are used to offer deafferented learning opportunities.
1.2. Goals and learning outcomes: a) Goals and learning outcomes are set in accordance with the study course. b) Goals and learning outcomes are combined for better achievements. c) Learning goals and outcomes are systematically evaluated and adjusted for better achievements.
1.3. Study course content: a) Study course content corresponds to the defined goals and learning outcomes. b) Study course content is regularly analyzed by offering the variety of discipline-related content. c) Study course content is systematically innovated and renewed.
1.4. Teaching methods, models and strategies: a) Teaching methods, models and strategies corresponds to the defined goals and learning outcomes; b) Teaching methods, models and strategies are regularly analyzed by offering the variety of them to increase methodological variation; c) Teaching methods, models and strategies are systematically innovated and renewed to increase the effectiveness.
1.5. Effective study environment: a) The features of online/offline study environment are considered and applied accordingly. b) A big range of option offered by online/offline study environment are used for effective study process. c) New formats of online/offline study environment are continuously evaluated, developed and applied.
1.6. Assessment and Feedback: a) Appropriate assessment and regular feedback are used; b) A big variety of assessment and feedback are used, by adopting different assessment tools, including digital option. c) Innovative assessment and critically reflective feedback are used.
1.7. Reflection: a) Traditional reflection is used when possible. b) Regular reflection is used and integrated to the study process. c) Critically reflective and innovative reflection is used to identify areas for improvement.
II. Research – Innovative Criteria
2.1. Professional Engagements: a) Key elements of professional engagements are used on occasion. b) A variety of strategies of professional engagements is used for a range of purposes. c) New developments and ideas are created as a source of inspiration.
2.2. Organizational communication: a) Basic communication approaches are used. b) Communication is organized in effective and responsible way. c) Communication strategies are evaluated, reflected and a variety of them is effectively used.
2.3. Professional collaboration: a) Collaboration options are used to exchange content, knowledge, etc.

b) A big variety of collaboration options are used to explore new resources and methods. c) Collaboration is used for reflecting on and enhancing practices and competences.
2.4. Reflective practice: a) The development needs are understood through reflective practice. b) Corresponding competences are improved and updated through experimentation and reflective practice. c) Current research on innovative teaching is followed and integrated into practice.
2.5. Continuous self/professional development: a) Knowledge and skills are regularly updated. b) Different opportunities for professional development are regularly searched and training conducted. c) A range of possible training opportunities is evaluated and those which best fit to the development needs are selected and taken.
III. Digital Criteria
3.1. Selection of digital resources: a) Common educational platforms are used. b) Suitable digital resources are filtered, using appropriate criteria, by providing the feedback. c) A variety of different sources is evaluated on reliability and suitability, and effectively used.
3.2. Creation and modification of digital resources: a) Creating and modifying resources using basic tools and strategies. b) Creating and modifying resources using some advanced features. c) Creating, co-creating and modifying resources according to the teaching/learning needs, using a range of advanced strategies.
3.3. Management, protection and sharing of digital resources: a) Managing digital resources using basic strategies. b) Managing digital resources using some advanced features. c) Managing digital resources according to the teaching/learning needs, using a range of advanced strategies.
3.4. Engagement of learners for effective use of digital resources: a) Information and communication technologies are used to visualize and explain new concepts in a motivating and engaging way. b) The active use of information and communication technologies is put at the center of the instructional process, by offering the most appropriate tools. c) The active use of information and communication technologies is offered for fostering students' active, creative and critical engagement.
3.5. Facilitating learners' digital competence: a) Learners are encouraged to use information and communication technologies. b) Corresponding learning activities are implemented in which the use of information and communication technologies is retrieval. c) Suitable pedagogical strategies are critically reflected and adapted to facilitate the active and effective use of information and communication technologies.

Your gender □ Male □ Female □ Don't want to specify

Your age □ 18-24 □ 25–34 □ 35–44 □ 45-54 □ 55 -64 □ 65 and over

Country _____

Higher Education Institution _____

Occupation □ professor □ associated professor □ Docent □ Lecturer □ Assistant □ Other _____

Field _____

You experience in teaching/learning □ 1-5 □ 5-10 □ 10-15 □ 15-20 □ more than 20 years

Thank you for your time!