Linz School of Education Doctoral School Evaluation Report

November 2022

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Overview

The Doctoral Programme of the Linz School of Education (LSEd) was developed on the basis of education-related institutes and personnel of JKU. PhD in education was offered through various departments/faculties, but it was evident that a new education-focused School would greatly benefit JKU. Utilising the experiences of existing members of the University as well as hiring new professors enabled the establishment of LSEd and its Doctoral Programme. With local academic knowledge together with the experiences of Prof Zsolt Lavicza from the University of Cambridge's doctoral programme, a new curriculum was designed to best suit both Austrian and International students who wish to pursue education research degrees at JKU. The aim was to establish a world-class school of education with diverse research expertise and offer doctoral degrees to a wide variety of students. During the development phase since 2016, PhD students still enrolled on PhD programmes of various institutes, but with the initiation of LSEd in 2019 students started to transition completely to the new curriculum of LSEd. Nevertheless, since 2016 courses and seminars were similar to current courses, but the structure of the doctoral curriculum was enhanced based on the ongoing courses and expertise of JKU personnel. Since the initiation of doctoral school 15 PhDs were awarded of which 5 were completely following the new curriculum. In addition, LSEd continuously hosts PhD students from various universities and at least 5 PhDs are associated with the LSEd doctoral programme. Currently, 39 PhD students from 11 countries are enrolled in the Programme and numerous new students have started their enrolment process to LSEd. The LSEd doctoral programme is constantly gaining a reputation and interest in our work is expanding rapidly. As most PhDs are now publication-based cumulative PhDs a large number of publications (247) are written within LSEd, accordingly worldwide academic interest is growing towards our research in education. This materialises in the interests of new PhD students joining JKU, visiting numerous external students and professors, developments of joint doctoral programmes with LSEd, and running numerous research projects with partners in over 20 countries.

In this report, we will outline the personnel; structure and curriculum of LSEd; offer an introduction of the main research groups; summarise the characteristics of current and completed PhD students; highlight supporting activities of the LSEd doctoral school such as organising conferences, host visiting scholars, and develop projects; explain issues of sustainability and the long term productivity of the doctoral school, and finally list publications that enable the visibility and the increased international reputation of the LSEd research teams and their PhD students.

The Linz School of Education Introduction

The Linz School of Education coordinates and further strengthens the JKU's active contributions to teacher education. LSEd works together with Upper Austrian partners and the Central Cluster (universities, teacher education colleges, in-classroom training), playing a key role in educational sciences, subject didactics, supporting numerous academic areas at the JKU, continual education studies, training programs, and is available to respond to any questions or concerns pertaining to

teacher training and teacher education. The JKU offers Bachelor's and Master's degree programs in Secondary Education, Business Education, Civic Studies, School Management, a PhD in Education, Humanities and Cultural Studies, and Social Sciences, Economics & Business. The School focuses mainly on STEAM didactics, covering the fields of mathematics, computer sciences, natural sciences, and engineering, as well as research in education. In this regard, LSEd and its students not only benefit greatly from an unbureaucratic and interdisciplinary exchange with JKU institutes, they also enjoy networking opportunities and unwavering support from those in their respective fields.

The development of the Doctoral Programme was greatly influenced by the experiences of Prof. Zsolt Lavicza at the Faculty of Education, University of Cambridge. Univ-Prof. Lavicza was leading the educational research methods courses for postgraduate educational research students in Cambridge for over 7 years and shaped its programme together with colleagues from the UoC, Faculty of Education. The PhD programme of LSEd integrated substantial elements from these educational research approaches, the collaborative international environment, and the results-based approach of the PhD. Over the past five years, LSEd, and particularly Prof. Lavicza was able to attract a large number of international students, which highly contributed to the diversity and wide-ranging academic focus of the PhD programme. Austrian students together with their international peers engage in discussion of educational issues, collaborate on projects, and widen their perspectives on educational research. The development of such an international and vibrant community further results in internationally recognised publications and the representation of LSEd worldwide. Furthermore, it will be explained later that LSEd is expanding its focus on international collaborations with projects and setting up joint doctoral training with numerous institutions across the globe. Overall, the internationalisation and induced flexibility of the programme highly benefitted the development of the Doctoral School, added to the development of research for both students and faculty, and made LSEd already recognised in the international education research field.

Overview of the study programs offered by the faculty

Bachelor's, diploma, master's programs; doctoral or PHD programs; university courses (ULG)

LSEd is not assigned to a specific faculty instead it represents a cross-faculty entity that is directly assigned to the rectorate of the JKU. Amongst other the School of Education offers or is involved in the following study programs:

Bachelor
- Lehramt Sekundarstufe Allgemeinbildung (teacher education at secondary stage)

Master
- Lehramt Sekundarstufe Allgemeinbildung (teacher education at secondary stage)
- School management
- Politische Bildung (civil education)
- Psychologie (psychology)

Diploma
  ● Wirtschaftspädagogik (business and education)

Note: With the incorporation of the centre for language education and inter-cultural competencies LSEd will also be involved in various business masters and university courses on language education (i.e., English for engineers, Germany as a second language).

What are the links between the studies and the departments or research foci at the LSEd? Because of the interdisciplinary nature of educational research and subject didactics, the study programmes also reflect the research fields of the LSEd. That is, LSEd is engaged in various research fields that overlap with the teaching duties (see also the section on research groups below):
  ● STEAM research (research in instruction and learning in the following domains: mathematics, informatics, physics, biology, chemistry)
  ● General educational research
  ● Educational psychology research
  ● Educational sociology research
  ● Business and education research
  ● Language teaching and acquisition research

Because LSEd is engaged in both research and teaching in these domains, research-led teaching has always been common and is a particular feature of LSEd teaching.

How are the study programmes embedded in the profile of the faculty or the university (e.g., research-led teaching, development plan) as well as delimited from related studies? The revised teacher education (Lehrerbildung Neu) was introduced in Upper Austria and Salzburg (Cluster Mitte) in 2016. JKU has committed itself to participate in teacher education in joint cooperation with all other teacher training universities (10 in total) in Upper Austria and Salzburg. For this purpose, the JKU had received financial resources from the university structural funds (Hochschulstrukturmittel) as a start-up aid. Cooperation agreements between the teacher training universities in the Cluster Mitte regulate the cooperation. Accordingly, participation in Lehrerbildung Neu is also stipulated in JKU's development plan.

Compared to related study programs, such as business education or civil education, the teacher education program is differentiated in that graduates are admitted to teaching in schools, while graduates of business education are admitted to vocational education and training, and graduates of civil education do not receive a teaching license. With regard to teaching at the JKU; however, there are overlaps between the two fields of study in that the Department of Educational Research is involved in all study programs, not only in the teaching program for secondary general education (Lehramt Sekundarstufe Allgemeinbildung), and is responsible for the corresponding educational science and research methodology courses.

LSEd teaching team

Univ-Prof. Dr. Christoph Helm
Univ-Prof. Dr. Markus Hohenwarter
Univ-Prof. Dr. Zsolt Lavicza
Univ-Prof. Dr. Barbara Sabitzer
Univ-Prof. Dr. Lana Ivanjek (joining LSEd in March 2023)
Tba.: professor for language teaching and language acquisition research in English (joining LSEd in 2023)

The Curriculum

On the 1st of October 2018 the new curriculum of the LSEd PhD programme came into effect and was revised in 2020. The curriculum of the LSEd PhD programme was structured to facilitate a variety of student needs and availability and to fully enhance its academic potential. From the application process to their studies of the PhD students must follow these guidelines, but some flexibility is also integrated to suit different research directions. In addition, the doctoral training courses have been offered in a hybrid format so that students could attend sessions locally and remotely if needed. All sessions are video recorded and shared with the PhD group to enable further learning opportunities and all resources are shared in LSEd's *Slack* channel and online repositories. In this section, we will overview the curriculum and related administrative issues.

The application process

Students applying for the PhD are informed about both the administrative and research requirements of the programme. A guideline is developed by the LSEd team for administrative details and students must write a 3-5 page proposal about their planned research. Students get in contact with some members of the LSEd team to discuss their proposals and plans as well as to agree on possible supervision arrangements. Upon agreeing on the research plans, students must submit their proposals and administrative documents to LSEd and to the admission office. These documents are evaluated and if both the Admission Office and the LSEd leadership agree students are granted admission to the PhD programme. Often, students apply for scholarships and other grants and this process is also supported by the LSEd team.

Admission Process including administrative details

Scientific qualification, professional and interdisciplinary qualifications

Students must apply for admission to the PhD program in Education by using the website http://zulassung.jku.at. Their conditions for admission are regulated by §2 of the curriculum:

Students need to have either

- a degree (diploma or master) of an Austrian Fachhochschule (according to § 6 Abs. 4 Fachhochschul-Studiengesetz) in a related subject
- a degree (diploma or master) of a national or international university in a related subject (e.g., teaching degree)
- a degree of the Universitätslehrgang Aufbaustudium Schulmanagement, as long as 32 ECTS in science courses (forschungsbezogene Lehrveranstaltungen) are passed

After entering all relevant documents via the website, the Studienpräses (Univ.-Prof. Dr. Christoph Helm) evaluates the degrees of the candidate and may answer the request for admission:

1. admission without condition
2. admission with conditions: The student is admitted to the PhD program but has to pass a certain number of courses/credits. This number is specified by the Studienpräses. §2 (3) and (4) of the curriculum are guidelines to fix the additional courses depending on the degrees of the candidate
3. no admission

In either case a student applying for the PhD program should have a supervisor and a formal consent (Betreuungszusage) of his/her supervisor. If not so §2 (7) regulates the admission process. Apart of the curriculum, all students are informed to check for supervisors prior to the admission process.

Due to the interdisciplinary nature of the PhD, there are also repeated requests for enrolment from students who have completed an exclusively subject-specific study program without a pedagogical reference in their studies. These cases are examined by Helm, Lavicza, Hohenwarter, Sabitzer. Didactic and pedagogical courses are imposed on the applicants.

Recognition Process

The process of recognition of course achievements (former courses in other programs) is done via the website https://anerkennung.jku.at/ .

PhD course outline and course details

Students enrolled in the programme follow the structure and course outline below. However, it is possible that students enrol at different stages of the programme so that semester requirements are slightly shifted, but students follow a compatible course structure and work directions.

Besides the introductory and advanced educational research methods courses, the Research colloquium is the backbone of the PhD programme. It aims to develop a research community of PhD students, offer additional research training, and support their individual research with additional content and research impulses.

Year 1 - Semester 1
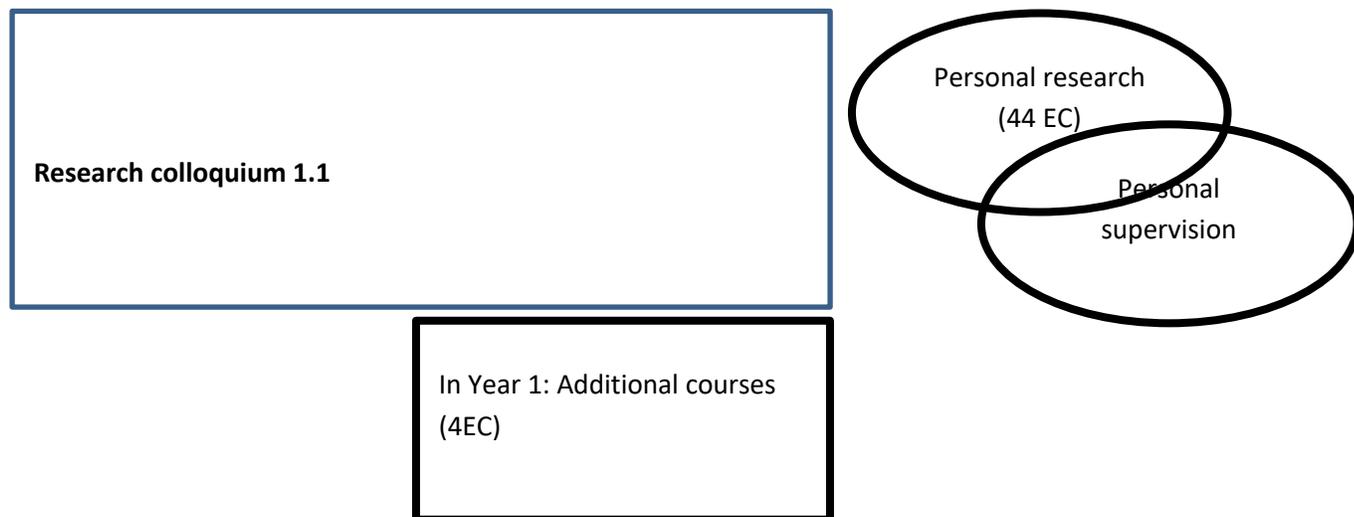
Introduction to educational research methods 1.1 (3EC)
Responsible coordinator: Zsolt Lavicza

Content:
- Introduction to the principles of education research
- Introduction to literature review, referencing, bibliographical software options
- Introduction to research questions and designs
- Introduction to educational research methodology and methods
- The aims and purposes of STEM education in schools
- Research on teaching STEM subjects in schools
- Preparing research design for PhD
- Structured introduction to writing a research proposal
- Research methods necessary for research design
- Continuity in supporting and aiding the students' research

Note:
The course plan for the semester is communicated to all PhD students which allows year 2 and 3 students to attend some sessions which they consider relevant for their work.

Dissertationskolloquium 1.1 (3EC)
Responsible coordinator: 3 members of faculty

Content:
- welcome session: information, structure, faculty, responsibilities
- guest lectures + discussion
- presentations by members of faculty, e.g. current research projects, topical issues of recent educational reform and debate

- Opportunities for small group discussions
- PhD proposal presentations and feedback by students completing the Year 1

Note:

in Dissertationskolloquium there are specific elements open to and meant for Year 1 students, e.g. presentation and defence of proposals, while other elements are open to and meant for all PhD students, e.g. guest lectures + discussion; presentations by members of faculty, e.g. current research projects, topical issues of recent educational reform and debate

Year 1 – Semester 2

Research colloquium 1.2

Presenting and defending the proposal

Personal research (44 EC)

Personal supervision

In Year 1: Additional courses (4EC)
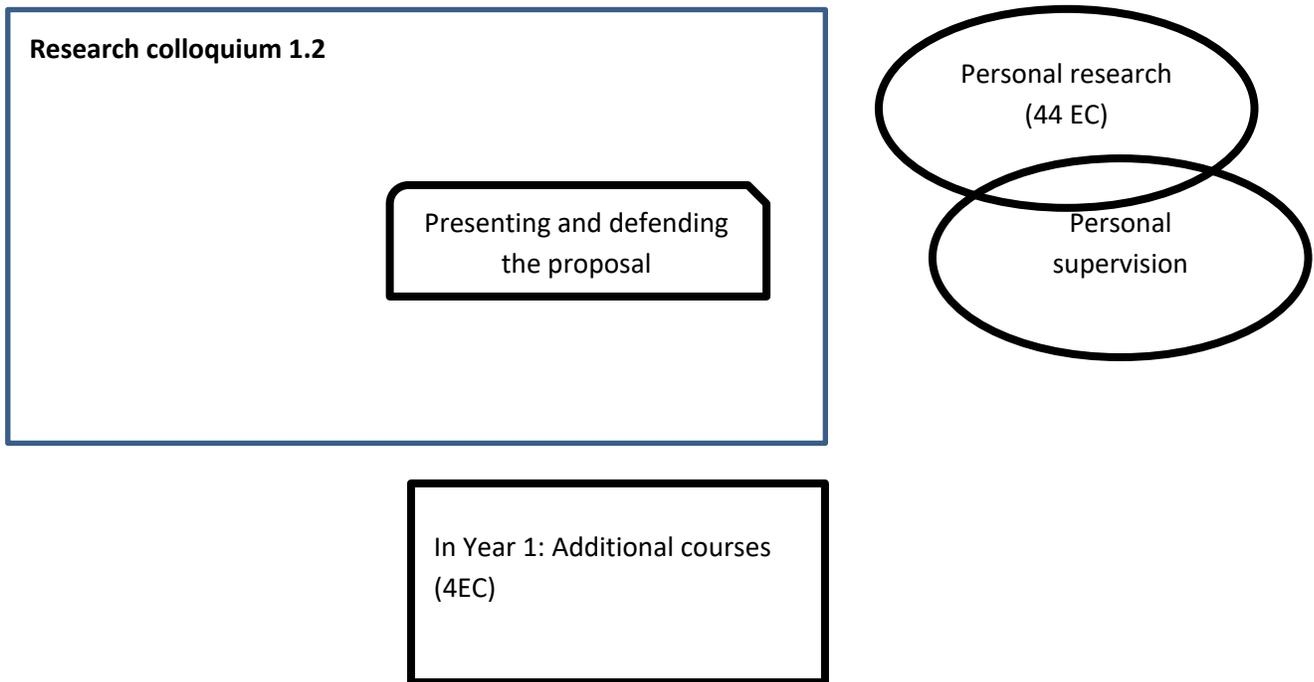
Introduction to educational research methods 1. (3EC)
Responsible coordinator: Zsolt Lavicza
Content:

- Continuation of research methods training from the first semester
- Classroom based research and designs and formulating specific research questions
- Qualitative, quantitative, and mixed methods research
- Data and sources: Interviews
- Data sources: Observations
- Data sources: Survey research
- Qualitative data analyses
- Quantitative data analyses
- Structured introduction to writing a research proposal,
- Research methods necessary for research design,

- Continuity in supporting and aiding the students' research

Theories in STEAM education (3EC) - optional
Responsible coordinator: Zsolt Lavicza

Content:
- Overview of theories in STEAM education and educational research

Dissertationskolloquium 1.1 (3EC)
Responsible coordinator: 3 members of faculty

Content:
- Similar structure as in semester 1
- PhD proposal presentations

Year 2 – Semester 3

Research colloquium 2.1

Personal research
(42,5 EC)

Personal
supervision

In year 2:
Additional courses (4 EC)
Diversity and Gender Studies
in Educational Context (1,5 EC)
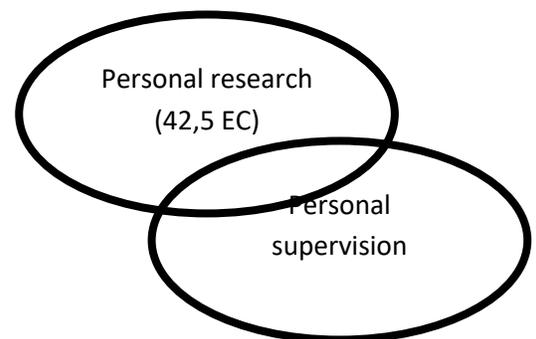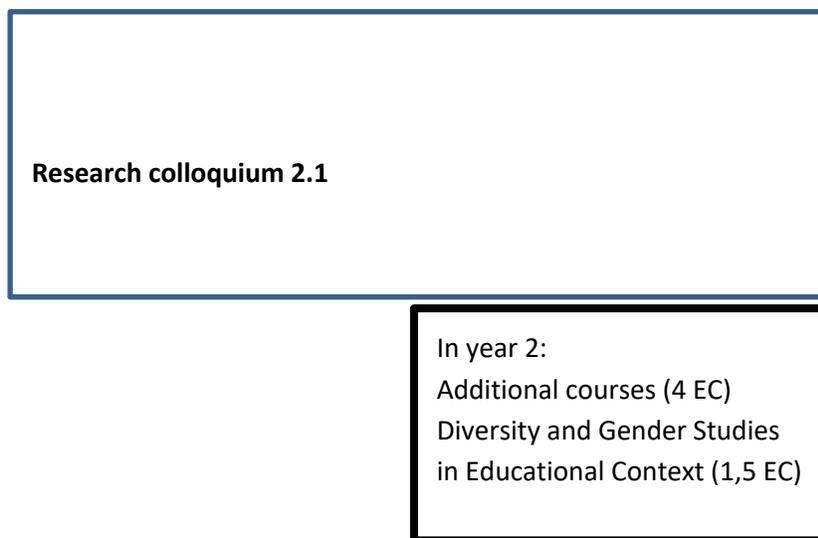
Advanced educational research methods 2.1 (3EC)
Responsible coordinator: Zsolt Lavica

Content:
- Theory, Methodology and Design in STEM Education Research
- Qualitative analysis: advanced methods in coding interviews and observations
- Design-based research
- Grounded Theory
- Documentary Analysis
- Digital resources for education research
- Exploring Understanding Through Talk
- Advanced survey designs

- Additional advanced research methods, practical workshops of data collection and data analyses continuity in supporting and aiding the students research

Note:

Year 1 Research methods are meant to support students in their way to the proposal. Year 2 Research methods are meant for students who are working on their thesis. It follows that these courses aim at different student groups and that they are usually held as separate courses. However, the two groups may be put together in specific circumstances if topics are offered which are relevant for both groups and could support the development of both student groups. The course plan for the semester is communicated to all PhD students which allows year 3 (and year 1) students to attend some sessions which they consider relevant for their work.

Dissertationskolloquium 2.1 (3EC)

Responsible coordinator: 3 members of faculty

Content:

- guest lectures + discussion
- presentations by students at specific steps of their research: research design; data analysis; interpretation and conclusion
- presentations by members of faculty, e.g. current research projects, topical issues of recent educational reform and debate
- workshops on specific research methods, also by external researchers (e.g. network analysis, how to use the publicly available PISA-data for my own research question), additional content-related workshops, partly by external speakers,
- whole group events (students and faculty) in which progress and programme aspects are discussed

Note:

In the Dissertationskolloquium there are specific elements open to and meant for Year 2 and 3 students, e.g. presentations by students at specific steps of their research: research design; data analysis; interpretation and conclusion, while other elements are open to and meant for all PhD students, e.g. guest lectures + discussion; presentations by members of faculty, e.g. current research projects, topical issues of recent educational reform and debate.

Year 2 – Semester 4

Research colloquium 2.2

Dissertationskolloquium 3.1 (3EC)

Personal research (44 EC)

Personal supervision
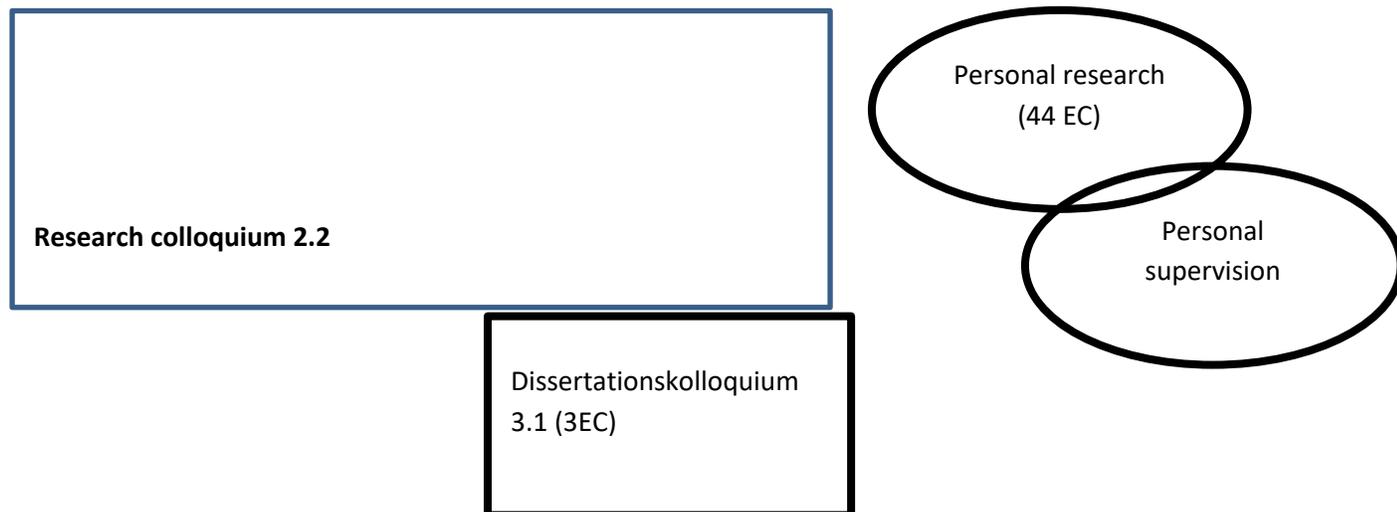
Advanced educational research methods 2.2 (3EC)
> Responsible coordinator: Zsolt Lavica

Content:
- Quantitative analysis: advanced data preparation, missing values and estimates
- Quantitative analysis: Inferential statistics
- Quantitative analysis: significance testing and comparative analyses
- Quantitative analysis: Regression analysis
- Quantitative analysis: Factor Analyses
- Quantitative analysis: Structural Equation Modelling
- Mixed methods analysis
- Writing publications in research journals
- Additional advanced research methods, practical workshops of data collection and data analyses
- Continuity in supporting and aiding the students research

Dissertationskolloquium 2.2 (3EC)
> Responsible coordinator: 3 members of faculty

Content:
- guest lectures + discussion
- presentations by students at specific steps of their research: research design; data analysis; interpretation and conclusion
- presentations by members of faculty, e.g. current research projects, topical issues of recent educational reform and debate
- workshops on specific research methods, also by external researchers (e.g. network analysis, how to use the publicly available PISA-data for my own research question), additional

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- content-related workshops, partly by external speakers,
- whole group events (students and faculty) in which progress and programme aspects are discussed

Year 3 – Semester 5

Research colloquium 3.1

In year 3:
Additional courses (4 EC)

Personal research (44 EC)

Personal supervision
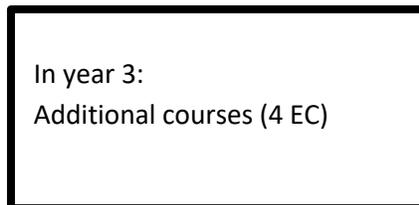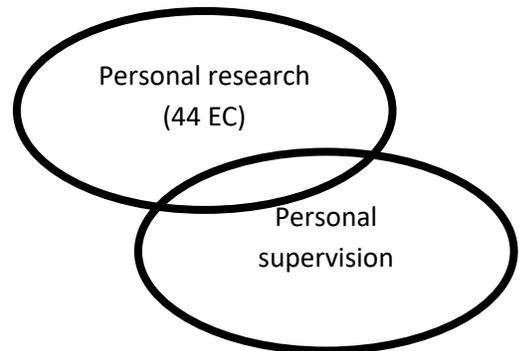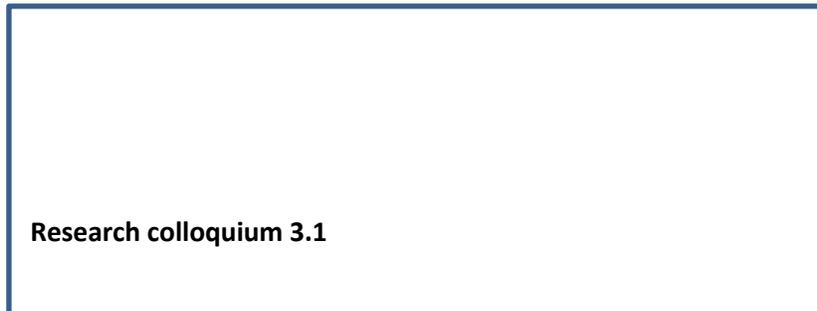
Dissertationskolloquium 3.1 (3EC) = Dissertationskolloquium 2.1 (3EC)
Responsible coordinator: 3 members of faculty

Year 3 – Semester 6

Research colloquium 3.2

Dissertation defense

Personal research (44 EC)

Personal supervision
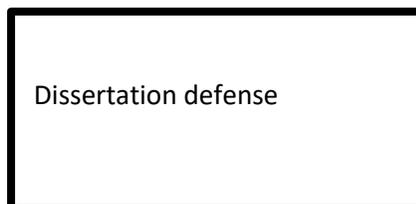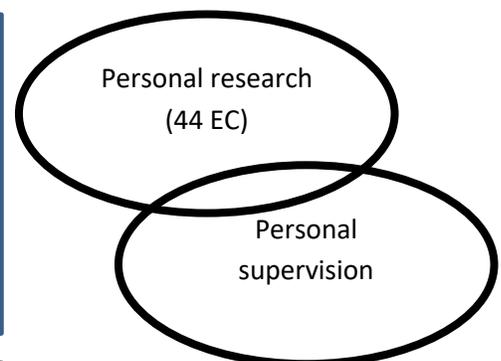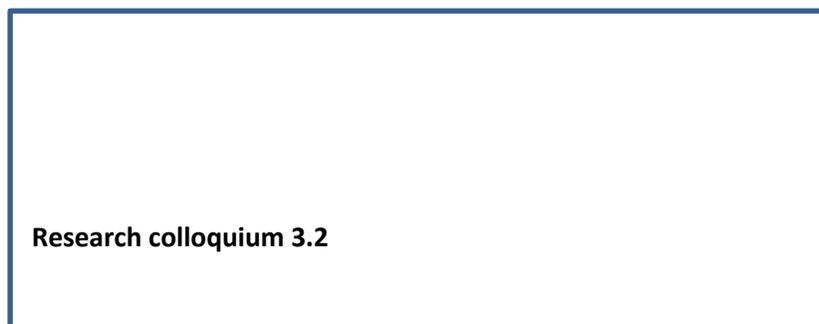
Dissertationskolloquium 3.2 (3EC) = Dissertationskolloquium 2.2 (3EC)
  Responsible coordinator: 3 members of faculty

Rigorosum (6EC): Defending the thesis

Note: There is no separate Dissertationskolloquium for year 3 students. The public defence of the thesis (Rigorosum (6EC) is part of the Dissertationskolloquium

As stated earlier, most PhDs are cumulative so that students present their published research papers composed into a PhD thesis.

How the defense is structured
Supervision and assessment of the dissertation are separated in the PhD in Education. I.e. the assessment of the dissertation is carried out by a 3-member examination senate, which consists of the first supervisor and two external experts. The grading of the dissertation results in equal parts from the judgment of the supervisory team, the external expert review and the defensio (see §9 of the Curriculum)

Digital teaching and learning

Given the international nature of the PhD in Education, all courses, seminars, and colloquia are provided in a hybrid format. Fortunately, LSEd has extensive hardware and software to support online teaching (e.g., Zoom, Owls). In addition, financial resources for new technical devices and tools for online teaching are being requested in current calls. Certainly, the pandemic boosted additional plans for online teaching. However, we see online teaching not only as an interim solution to bridge the pandemic, but as a necessity for our internationally-oriented PhD program. Furthermore, hybrid teaching is also required due to the current shortage of teachers, as this makes part-time, location-independent study necessary even for working teachers who want to take the PhD. In order to ensure the best possible engagement of students and/or lecturers who participate in classes in a virtual environment, in cooperation with Ars Electronica and the University of Tallinn, the use of telepresence robots began. The use of telepresent robots provides a better in-person feeling for the people who participate in virtual classes and contributes to better active participation. Taking into account that LSEd does not own telepresence robots at the moment, this type of teaching is held with the above-mentioned partners, however, the acquisition and use of these robots is one of the goals within the projects that are submitted or in preparation.

In addition to the application in classes at LSEd, all conferences are held in a hybrid environment. In this way, the virtual participation of participants who are not able to participate in person is ensured. Most of the presentations that are reflected in person during the conferences are recorded and shared with the participants after conferences and lessons. Participants can gain a deeper understanding of the level and quality of interaction, engagement, and nonverbal activity among participants both during the discussion and later, when analysing the conference recording, thanks to web conference technology, which encourages immediate and spontaneous

responses, facilitates an active moderator role and allows for immediacy and spontaneity in responses. In order to ensure the quality of the virtual presentation at LSEd, materials have been developed that can help teachers, students and presenters in the preparation and resolution of the virtual presentation, an example of such materials can be found at the link: https://www.geogebra.org/material/edit /id/mhwa3dxx .

Heterogeneity-sensitive teaching

Attention to heterogeneity in teaching is greatly addressed. The PhD in Education curriculum requires students to do a course on diversity, i.e., Diversity and Gender Studies in Educational Context (1,5 ECTS). The Ph.D. learning and teaching approach follow the concept of student-centred teaching, in which all students can participate in the research- students' community in accordance with their capabilities. To promote diversity-sensitive teaching, different methods, tasks, and media are used. Hybrid learning concepts offer special potential for including students with different needs, especially in the context of academic research and writing.

Quality assurance and further development

Influence of quality assurance results on further development (results from course evaluations, study evaluations, indicators and key figures on student population, external experts, etc.). Each semester, the course is evaluated anonymously by the participants of the teaching event via the study administration program KUSSS. Only the course instructors have access to this feedback data and are called upon to further develop their courses accordingly. In the future, it is planned that the head of the study commission will also receive an anonymized, summarized evaluation of the student feedback, so that the study commission can also respond to students' feedback in the context of curriculum development.

Participation of students in the development of the curriculum (curriculum commission, senate), opportunities for feedback on study organization and study conditions.

The study commission of the PhD in Education programme is composed of 5 representatives of the professors' curia (Lavicza, Helm, Sabitzer, Bacher, Mara), of 5 representatives of the post-doc level (Graz, Himmelsbach, Monkowius, Weinhandl) and of 5 student representatives (Maxian, Mayrhofer, Klinger, Gruber, Hartinger). The study commission represents the central body in which students can raise concerns and requests for the further development of the curriculum.

In order to ensure the quality of doctoral studies, visits by external lecturers from other international universities are organized every semester (please see the list below: International researchers supporting our PhD courses). During the visit, in addition to lectures, international experts provide feedback to students about their research and research plans through individual and group consultations. Taking into account that this practice has proven to be very good and beneficial, the plan is to expand this cooperation with international experts, as well as establish new contacts with experts from different fields. In this way, it aims to improve the quality of studies

and research at LSEd. Furthermore, dissertations are based on high-quality international publications ensuring the quality of PhD students' work. Theses are examined by world-renown education researchers and reports are submitted for the PhD evaluation committee.

Additional information and personnel

Additional courses may include summer schools and workshops at other universities and presentations at conferences.

The Faculty consists of all LSEd members with 'Habilitation' plus a few invited members of the collaborating teacher education institutions in Upper Austria:

- Dr. Christoph Weber (PHOÖ)
- Dr. Katharina Hirschenhauser (PHOÖ)
- PD Dr. Karin Heinrichs (PHOÖ)
- Dr. Susanne Oyrer (PHDL)
- Dr. Emmerich Boxhofer (PHDL)

Besides local co-supervisors from a variety of universities across the world. Currently, this is the list of International researchers supporting our PhD courses and supervisions.

- Prof. Mara Alagic School of Education, Wichita State University, USA
- Prof. Noah Dana-Picard Jerusalem College of Technology, Israel
- Prof. Selay Arkun Kocadere Hacettepe University, Turkey
- Prof. Jose-Manuel Diego-Mantecón University of Cantabria, Spain
- Prof. Benjamin Rott University of Cologne, Germany
- Prof. Irina Lyublinskaya Teachers College of Columbia University, USA
- Prof. Sencer Corlu, Oslo Metropolitan University, Norway
- Prof. Pamela Burnard, University of Cambridge, UK
- Prof. Ornella Robutti, University of Torino, Italy
- Dr. Carla M.A. Pinto Polytechnic Institute of Porto, Portugal
- Dr. Adi Nur Cahyono Universitas Negeri Semarang, Indonesia
- Dr. Kristof Fenyvesi University of Jyväskylä, Finland
- Dr. Houssam Kasti Qatar university, Qatar
- Dr. Yves Kreis University of Luxembourg, Luxembourg
- Dr. Filiz Mumcu Manisa Celal Bayar Üniversitesi, Turkey
- Dr. Janika Leoste, Tallinn University, Estonia

LSEd Research groups

LSEd is currently organised into several main research groups General, Mathematics, STEAM and Computer science education and other disciplinary research groups are working within and beyond this umbrella. In this section, we outline the main aims and research topics of these groups as it offers insights into how PhD students are organised by their interests and how the different visions of their leaders envision their development. Certainly, there is considerable overlap among groups and there is extensive collaboration. Thus, these groups are supporting each other and supplement their ideas, as well as students, are pooled in courses to develop their educational research skills.

General Education

Within the LSEd, the Department of Educational Research is the focal point for general educational research questions and tasks. Thus, in teaching, the Department of Educational Research is responsible for courses in basic educational science or in educational science, pedagogy, general didactics and educational psychology, as well as developmental psychology. Research at the Department of Educational Research is also oriented accordingly. Central research fields are

- Schooling & COVID-19 (research cluster with PH Zug and PH St. Gallen)
- Digitization in learning contexts (e.g., research project "Digitization of the Austrian Education System") (with University of Krems).
- School and teaching effectiveness research, teaching quality in higher education (with PH OÖ)
- (Educational) methodological research in the field of latent multilevel analysis (e.g., optimal design research) (with University of Tübingen)
- Education, migration & diversity (e.g., Erasmus projects: ACRAS, CRELES)
- Educational governance, school research & school development (& consulting) research
- Educational psychology (e.g., learning with multiple solutions, contextual conditions of cognitive-affective development in multiple learning environments)
- Teacher education research (portfolio work, research on pedagogical practical studies, longitudinal study on competence development of student teachers)
- …

In terms of personnel, the Department of Educational Research is staffed by four habilitated professors (Altrichter, Helm, Huber, Langer) and one habilitation-equivalent staff member (Große).

To foster research cooperation with the two universities of teacher education of Linz (PHOÖ and PHDL), the Linz Centre for Educational Research and Evaluation (ZB) was founded in 2018. Hence, the ZB is a cooperative effort between the Linz School of Education at the Johannes Kepler University Linz, the University of Education Upper Austria, and the Private Pedagogical University at the Linz Diocese. The ZB aims to intensify scientific/academic and didactic exchange

in the area of educational research and as part of the collaboration, advance scientific and academic expertise in educational research and evaluation.

The ZB currently focuses on these *main objectives*:

- Drafting, implementing, consulting, and evaluating *joint educational research projects*, particularly in the field of educational and school development, teacher education research in educational equity as well as evaluating educationally-related development projects.
- Develop concepts, measures and programs for research-related continual education for employees at all participating institutions
- Continually develop research-related *continual education* of teachers at all types of schools in Upper Austria to support a better understanding of processes and results in educational research as well as for use in the classroom and school development in joint teacher education

The ZB is managed by a collaborative team consisting of members from all three participating institutions (JKU: Herbert Altrichter and Christoph Helm). The ZB is currently involved in the following *collaboration projects* in the areas of *research, development, evaluation and continual education*.

- Competence Development and Study Experience in Educating Teachers. A Longitudinal Study on the Development of Job-Related Characteristics in the New Teacher Education Studies Program
- Researching Education in the Foundations of Pedagogical Education New

The ZB contributes its research expertise in support of the doctoral degree program: PhD in Education.

Mathematics Education

Mathematics is the basis of our digital era, so mathematics education is central to the LSEd and our society in general. The Department of Mathematics Education is responsible for both the education of prospective secondary mathematics teachers and research in the field of learning mathematics. The Department of Mathematics Education coordinates, administers and is responsible for running the courses in the Bachelor's and Master's degree programmes. In this context, both purely subject-specific (e.g., algebra, calculus, or stochastics) and subject-didactic courses (e.g., school mathematics or mathematics didactics) are offered. Concerning research on learning mathematics, the different working groups of the Department of Mathematics Education deal, on the one hand, with purely subject-didactic topics and, on the other hand, with the use of technologies in learning mathematics. Central research foci in this context are:

- Calculus, applications of calculus as well as school mathematics calculus.
- Geometry, applications of geometry and school mathematics geometry
- Algebra, linear algebra and number theory as well as their applications
- Use of technologies in learning mathematics:

i) with a focus on technological tools such as GeoGebra (software) or 3D printing (hardware)

ii) focusing on technology-enhanced teaching approaches such as flipped education.

• Mathematics for interested and gifted students
• Transition of learning of mathematics from secondary to tertiary level
• Mathematics and the Arts

In terms of staff, the Department of Mathematics Education comprises 35 employees – two full university professors and three post-doctoral employees (one staff member is on maternity leave).

In order to strengthen the interplay of teaching and research in the field of learning mathematics, the Linz Centre for Didactics of Mathematics (LZDM) was founded and is managed by the Department of Mathematics Education of the LSEd. The LZDM connects researchers and lecturers of the LSEd, the PH OÖ and the PHDL. In order to be able to develop a stronger connection between research and practice in mathematics learning, the Center for Open Digital Education (CODE) was founded, which is explained in more detail in the following section.

Center for Open Digital Education (CODE)

The Center for Open Digital Education (CODE, https://www.jku.at/linz-school-of-education/forschung/zentren/mint-didaktik/code-center-for-open-digital-education) was founded in 2021. At the CODE, educational research concerning learning with new technologies is carried out. Furthermore, quality-assured Open Educational Resources (OER) for learning STEM, focusing on mathematics, are developed. Based on many years of successful work on the GeoGebra initiative, the CODE aims to become an innovation leader in the field of applied research and development of OER in German-speaking countries and beyond. The CODE aims to contribute to the digitisation of schools and universities, especially in the area of quality assurance of learning platforms and OER. The published materials and results of CODE are intended to provide concrete support for Austrian students and teachers. In addition to the development of materials, the development process of OER is scientifically accompanied. Here, the main foci are researching technology-enhanced mathematics learning environments and mathematics students' needs and characteristics. A pilot project of the CODE is the support of learners through interactive materials for a sustainable skills acquisition (FLINK, http://www.geogebra.org/flink). FLINK aims to accompany and support students when using digital devices at the beginning of secondary education in Austria since the autumn of 2021. Specifically, quality-assured interactive and open learning resources for lower secondary mathematics are developed within the FLINK project. These resources focus particularly on automatic feedback and adaptive tasks.

STEAM Education

The importance of Science, Mathematics, Engineering, and Technology, as one of the central aims of modern education, was further acknowledged in the 1990s when the approach of grouping these academic disciplines together was introduced as STEM. A decade later, the acronym was supplemented with the letter "A" which represents Arts in a broader sense of creation and creativity. As of today, the STEAM approach in education is seen as a way of guiding students to study professions that, on the one hand, are useful for society, but, on the other hand, require skills and knowledge that are closely related to STEAM disciplines. To this end, the STEAM approach in education aims at integrating different disciplines in a meaningful way, preparing students for their future professions. The STEAM approach is being promoted by various stakeholders. Although STEAM is a promising approach to education, it is not as widespread as it could be. It is difficult to integrate technology, the arts, or science with other disciplines due to dense syllabi, lack of allocated paid lesson time, and the time-consuming nature of STEAM teaching (due to using problem learning, project learning, discovery-based learning, and other modern learning approaches). This is also the reason why additional research in the field of STEAM education is necessary, which will contribute to the better integration of STEAM into the actual teaching process at all educational levels. Development and improvement of STEAM education based on scientific recommendations contribute to the provision of labour in the fields of science, technology, engineering, and mathematics, which are some of the most deficient occupations in Europe and globally. Many studies indicate that these are precisely some of the reasons why doctoral studies in the field of STEAM education and their continuous improvement should be continuously encouraged (Feldon et al., 2010; Blaney et al. 2022).

Accordingly, the STEAM Education group at LSEd aims to develop innovations in technologies, pedagogies, and policies as well as innovate in research methodologies and theories (Figure 1). In addition, PhD students work on ideas for transdisciplinarity and integrating creativities into education.

Technological Innovations
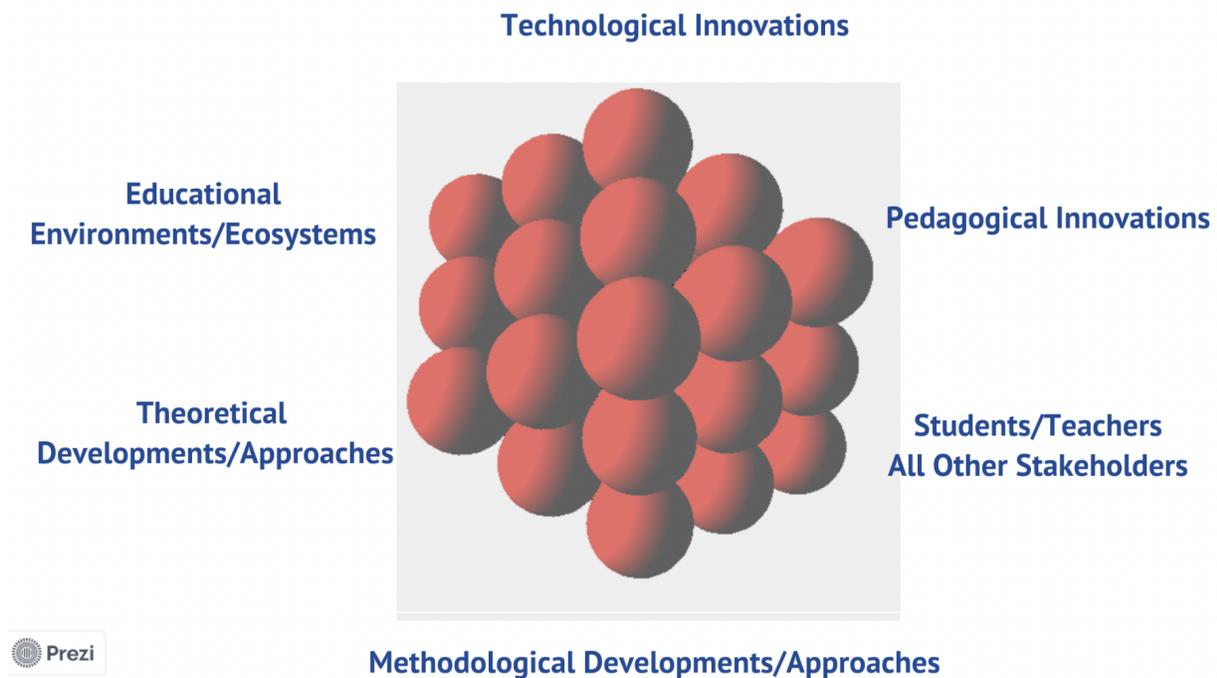
Figure 1: STEAM Education's Educational, Technological, Theoretical, and Methodological
Innovation approaches

Topics such innovations include
- Transdisciplinary approaches in education
- Designing technological interfaces for education
- Online and hybrid teaching and learning environments
- Evaluating qualities of online learning resources
- Utilising data from sensors
- Augmented Reality for teaching and learning
- 3D printing in education and teacher education
- Learning analytics in education
- Gamification in STEAM education
- Developing educational games
- Connecting physical and digital learning environments
- Microgames in education
- Cultural aspects of STEAM education
- Architecture, Arts and culture in STEAM education
- Outdoor STEAM learning and teaching
- Robotics in education
- Exploring the roles of videos in education
- Examining student lived cultures - Memes in education
- Investigating digital comics in relation to socio-scientific issues
- Learning STEAM subjects through music and dancing
- Involving girls and woman in STEAM education
- Origami for STEAM learning

- Arts-based STEAM learning and teaching
- Computational thinking education
- Flipped classroom approaches in education
- Transforming spaces to learning opportunities
- Coaching and deliberate practice in education
- Students' wellbeing in education
- Introducing big data, statistics to sustainability education
- Economics and sustainability education
- Enhancing accessibility for special need students
- STEAM for talented students

There is a considerable overlap between the STEAM and Computer Science research groups, but research is complementary and led by a slightly different vision of the two leading professors. However, the research groups deeply collaborate on overlapping ideas.

Instructional Technology and Computer Science Education

The research group *Instructional Technology and Computer Science Education* was founded in 2017 with the newly implemented professorship of Instructional Technology and conducts research in the areas of *Digital Literacy, Computational Thinking* and *Computer Science Topics integrated in all subjects and all educational levels*, e.g. *Modeling as Learning Strategy in Language Acquisition* or *Robotics in Primary School*.

The group is responsible for the education of prospective computer science teachers as well as basic digital education for all subjects. It is currently composed of 1 professor and 2 pre-doc assistants as well as 16 employees (mainly part-time) in several projects (3 post-doc, 2 pre-doc and 11 student assistants). We mainly offer courses for the Computer Science Education programme (School Informatics, Subject-specific Pedagogy, Digital Education) but also for the PhD in Education programme (Diversity and Gender), Computer Science and Artificial Intelligence (Special Topics, Ethics and Gender Studies).

Furthermore, we established a teaching-learning lab focusing on Computational Thinking and Digital Literacy for everyone, the COOL Lab. It offers lectures and workshops for school classes and kindergartens, teachers of all subjects as well as special groups such as highly gifted students or "girls only". The COOL Lab also serves as a research basis for scientists and PhD-students and offers e.g. workshops regarding (digital) tools for teachers and researchers.

The COOL Lab

The innovative teaching-learning lab for digital education & computational thinking.

The COOL Lab is a teaching, learning, creative and research lab for ALL subjects with different, sometimes changing topics and labs in which, depending on their interests and skills, visitors can slip into the role of learners, teachers, researchers and developers, try out and/or use the latest (instructional) technologies.

COOL stands for Cooperative Open Learning, Computer(Science)-supported Open Learning (technologies and computer science concepts to support teaching and learning in all subjects), Cross-curricular open and online learning as well, and "cool" in the sense of motivating, creative, exciting, playful, etc.

The following topics and focal points are offered:
- Digital Education & Computer Science
- Discover and apply digital technologies
- Computational thinking across all subjects and school levels
- Design and develop digital products (e.g. website, apps, games)
- Learn to teach Computer Science
- Planning and delivering creative, technology-enabled instruction
- Get to know and apply innovative teaching and learning strategies and tools for CS
- Promote learning skills such as understanding texts, problem solving, logical thinking, etc
- Research & practice for CS
- Internships and career orientation for students in the field of CS
- School & research projects for and with partner schools
- Arouse interest in natural sciences, computer science and technology
- Promote young people and talents
- Strengthen expertise and skills
- Promote text comprehension and production across all subjects
- Language(s) in natural sciences and computer science (e.g.: "formula languages" in mathematics, gender-sensitive language in natural sciences, communication between humans and computers)
- Learning and using programming languages and foreign languages

Language Science Education

In the fall of 2022, the Center for Business Languages and Intercultural Communication (ZFS) became the third department - along with the Department of Educational Research and the STEAM Department - to be incorporated into the School of Education. The university-wide Center for Business Languages and Intercultural Communication (12 contract educators and/or senior lecturers, totalling approx. 25 lecturers) offers approximately 100 hands-on, interactive foreign language courses per semester, preparing students at all faculties & schools to pursue a future career in a globalised world. The Center provides support services to all incoming and outgoing students studying in one of fourteen academic degree programs at the JKU Faculty of Social Sciences, Economics & Business. The ZFS is led by a professorship for language teaching and language acquisition research in English. Currently, this professorship is vacant, i.e., the appeal process is underway. Meanwhile, the management is taken over by Christoph Helm on an interim basis.

Regarding research, the ZFS is supposed to conduct research in the area of "*Language Teaching and Language Acquisition Research in English*" at an international level and with reference to

real-world applications. The future professor should be experienced in an additional sub-field of English linguistics (i.e., teaching technical English, business English, experience in business, intercultural communication). Therefore, in the near future, a wide research field in the field of language teaching and learning research will be opened/available to the doctoral students.

Additional Research groups

Physics Education

In the previous years, the Physics Education group was closely integrated in the institutes of the Physics Department with the lead of Dr Christoph Cobet and Dr Ingrid Graz. Currently, 3 PhD students are supervised whose research is connected to physics education. However, with the appointment Prof. Lana Ivanjek research activities in the field of educational research will be significantly strengthened.

Chemistry Education

In the field of chemistry, one PhD student works on the development of experiments for schools which are simple, cheap and broadly available and also ideally avoid problematic waste and security issues. Many chemistry experiments require partly expensive laboratory equipment. Additionally, for individual hands-on experience, such equipment has to be available in high numbers as every student should ideally perform their own experiments. Such infrastructure is not always available in many schools, even in wealthy countries. Similarly, laboratory equipment in many schools without a focus on natural science is often very poor. This project thus addresses these - from the point of view of practical knowledge - adverse learning environments and aims to give students the opportunity to gain hands-on experience in chemistry through a set of versatile experiments. For example, unusual reaction vessels made from cheap and everyday mass-produced products will be used which have the advantage that they can be disposed of directly after the experiment thus avoiding lengthy purification procedures in the classroom by still maintaining experimental accuracy and didactic value. Also, the use of 3D printers for the production of simple laboratory equipment will be tested and the mobile phone will be probed as an easily available sensor for chemical reactions and/or analytics. The development and evaluation of such experiments is a lengthy and iterative process, in which the procedures are to be further optimised through the feedback of the experience in school classes. Finally, it should be determined whether the use of such experiments improves learning motivation and which or if competencies are added or consolidated.

PhD Students completed their studies

The preparation for the doctoral school was developed through enrolling PhD students on education and natural sciences doctoral programmes. The establishment of LSEd had a parallel period with the old doctoral enrolments, but essentially both groups of students were taking similar sets of courses. In addition, there are several visiting PhD students who spent substantial time at LSEd and were co-supervised at JKU.

PhD students from pre-LSEd system (started from 2016)

- **Dr Barbara Kimeswenger (2018)** - Identifying and Assessing Quality of Dynamic Materials forTeaching Mathematics (Currently lecturer at JKU and PPHDL)

- **Dr Edith Lindenbauer (2018)** - Students' Conceptions and Effects of Dynamic Materials regarding Functional Thinking (Currently at JKU and PH Upper Austria)

- **Dr Diego Lieban (2019)** - Exploring opportunities for connecting physical and digital resources for mathematics teaching and learning (Currently Professor at Instituto Federal de Educação, Ciência e Tecnologia do Rio Grande, Brazil)

- **Dr Robert Weinhandl (2019)** - Flipped approaches in secondary mathematics education (Currently post-doctoral researcher at JKU)

- **Dr Sara Hinterplattner (2020)** -The Waiting of Gifted Students and its Impact on Talent Development Projects (Currently employed at Dynatrace)

- **Dr MelanieTomaschko (2020)** - Exploiting the Potential of Mobile Learning in Mathematics Education (Currently research assistant at JKU)

- **Dr Gahleitner, Simone Lucia (2022**). Die Bildnerische Erziehung im Primarstufenlehramt. Die Entwicklung des Bildes vom Unterrichtsgegenstand Bildnerische Erziehung bei Lehramtsstudierenden. Dissertation an der Linz School of Education der Johannes Kepler Universität Linz (Currently at PH Upper Austria)

- **Dr Gamsjäger, Manuela (2019).** Beiträge von Schüler/innen und Schülervertretungen zu Schulentwicklung und –gestaltung. Perspektiven von Schüler/innen, Schülervertretungen, Eltern und Lehrpersonen zu Formen, Bedingungen sowie Möglichkeiten der Mitwirkung und Mitbestimmung in Österreich. Kumulierte Dissertation. Phil.Diss. an der Johannes Kepler Universität Linz (Currently at PH Upper Austria)

- **Dr Troyer, Antonia (2019).** Steuerungsperspektiven in der Schulentwicklung. Rekontextuali¬sierung von Handlungsergebnissen der Bildungspolitik und Bildungsverwaltung am Beispiel der neuen Oberstufe. Phil.Diss. an der Johannes Kepler Universität Linz.

- **Dr Zuber, Julia (2018).** Individual teacher characteristics and the implementation of an educational reform. Kumulierte Dissertation. Phil.Diss. an der Johannes Kepler Universität Linz (Currently at FH Upper Austria)

PhD students LSEd new system (starting from 2018)

- **Dr Stefanie Schallert (2021)** - Towards inquiry-based flipped classroom scenarios in secondary mathematics education: a design-based research study(Currently at Virtuelle PH and Voralberg PH)

- **Dr Martin Andre (2021)** - Implementing the statistical investigative process in secondary school education (Currently lecturer at PH Tirol)

- **Dr Ben Haas (2021)** - Transition from in-class to outdoor learning with real-world mathematical modelling (Currently lecturer at University of Luxembourg)

- **Dr Karin Tengler (2022)** - A robotics-based approach supporting computational thinking skills at primary school (Currently research assistant at JKU)

- **Dr Marina Rottenhofer (2022)** - Modeling in the Foreign Language Classroom: A Hands-on Approach to Foster Computational Thinking Skills (Currently research assistant at JKU)

Visiting PhD students
- **Dr Branko Andjic (2020)** - University of Montenegro - Development of new approaches in botanical education of partially sighted and blind students (Currently Postdoctoral Researcher at LSEd)

- **Dr Giulia Bini (2021)** -University of Torino - Mathematical memes: from internet phenomenon to digital educational resource (Currently Postdoctoral Researchers at the University of Torino)

- **Dr Bjarnheiður Kristinsdóttir (2021)** - University of Iceland - Silent video tasks, their definition, development, and implementation in upper secondary school mathematics classrooms - (Currently Assistant Professor at University of Iceland)

- **Dr Renata Vagova (2021)** - Kontantine the Philosopher University, Nitra, Slovakia - Exploring the interplay of physical and digital manipulatives to develop students' visualisation in solid geometry (Currently research assistant at the KPU, Nitra Slovakia)

Regarding PhD candidates that are supervised by the Department for Educational Research, PhD candidates are often teachers who are employed at schools next to their PhD. Hence, most of the graduates continue to work in schools. However, it also happens from time to time that PhD graduates end up in academia. This is very rare, however, as permanent postdoc positions are hardly available in Austria and teachers who have a secure jobs do not apply for temporary positions. International students in STEAM Education mostly stay in academia and work as postdocs, researchers and professors after graduating from LSEd. There is a rather vibrant job market for STEAM and Computer Science education graduates and positions are becoming increasingly available worldwide.

PhD dissertation repository
https://drive.google.com/drive/u/0/folders/16uLlBIidOzFwmArWIzsHoTdCg4V56mkx

Current PhD Students

Currently, there are 39 PhD students enrolled in the doctoral school. The majority of students are coming from Austria, but there is a growing number of international students in the programme coming from a variety of countries

The LSEd PhD programme is becoming attractive and draws numerous students to Linz. Students are applying for a variety of scholarships and also being employed in research projects at LSEd. Furthermore, prospective students

There are currently 39 doctoral students from 11 countries enrolled in the Linz School of Education's doctoral studies. Data on PhD students are given in Table 1.

It should also be mentioned that questions in educational science are often interdisciplinary or are dealt with by other disciplines (e.g. psychology or sociology), so that from time to time PhD candidates decide not to do their doctorate in the PhD in Education, but in the doctoral programs in psychology, sociology or social economy. Nevertheless, these are supervised by professors of the School of Education, so resources of the PhD in Education (e.g. seminars, colloquia) are often used. Currently, Ms Postlbauer (Sociology), Ms Wisenöcker (Psychologie), Ms Fellner (Sociology), and Ms Decker (Social economy) do their PhD projects within the LSEd but in a different program than the PhD in Education.

Specialisation	Last Name	First Name	Country
STEAM Education	Fraser	Anneliese	Austria
STEAM Education	Hörmann (former Kröhn)	Corinna	Austria
STEAM Education	Ertl	Martin	Austria
STEAM Education	Otto	Korbinian	Austria
STEAM Education	Schmidthaler	Eva	Austria
STEAM Education	Infanger	Eva Maria	Austria
STEAM Education	Zöchbauer	Johanna	Austria

STEAM Education	El Bedewy	Shereen	Egypt
STEAM Education	Schwinghammer	Michaela	Austria
STEAM Education	Scheiblecker	Stefan	Austria
STEAM Education	Kuka	Lisa	Austria
STEAM Education	Hofer	Dominic	Austria
STEAM Education	Békési	Brigitta	Hungary
STEAM Education	Kastner-Hauler	Oliver	Austria
STEAM Education	Albaner	Birgit	Austria
STEAM Education	Ulbrich	Eva	Austria
STEAM Education	Rahmadi	Imam Fitri	Indonesia
STEAM Education	Handl	Julia	Germany
STEAM Education	Teo	Oi Mei	Singapore
STEAM Education	Mate-Klatyik	Andrea	Hungary
STEAM Education	Armenta Franco	Abril	Mexico
STEAM Education	Aral	Nilay	Austria
STEAM Education	Laksmiwati	Pasttita Ayu	Indonesia
STEAM Education	Jeong	Minju	South Korea
STEAM Education	Abrori	Fadhlan Muchlas	Indonesia

STEAM Education	Tejera	Mathias	Uruguay
STEAM Education	Hosic	Rusmir	Austria
STEAM Education	Sinnemäki	Jukka	Finland
STEAM Education	Dos Santos	José Manuel	Portugal
General Education	Schaupp	Michael	Austria
General Education	Schalk	Maritta	Austria
General Education	Paraluppi	Ulla	Austria
General Education	Steinbeiß	Gregor-Jan	Austria
General Education	Schmollmüller	Mathias Gerald	Austria
General Education	Rottenhofer	Marina	Austria
General Education	Wimmer-Furian	Pia	Austria
General Education	Jaeger	Clemens	Austria
General Education	Bruch	Sabine	Austria
General Education	Leitner	Sandra	Austria
General Education	Martin	Stefanie	Germany
General Education	Lauss	Julia	Austria
General Education	Brewster	Elke	Austria

Table 1: Information about enrolled PhD students at Linz School of Education.

Demographic analysis indicates that the majority of students at the Linz School of Education are from Austria (64%), while 36% are international students, Figure 2. The most represented international students are students from Indonesia (10%), followed by Hungary (5%) where students from Germany, Finland, South Korea, Singapore, and Egypt are represented with a smaller percentage (2%).
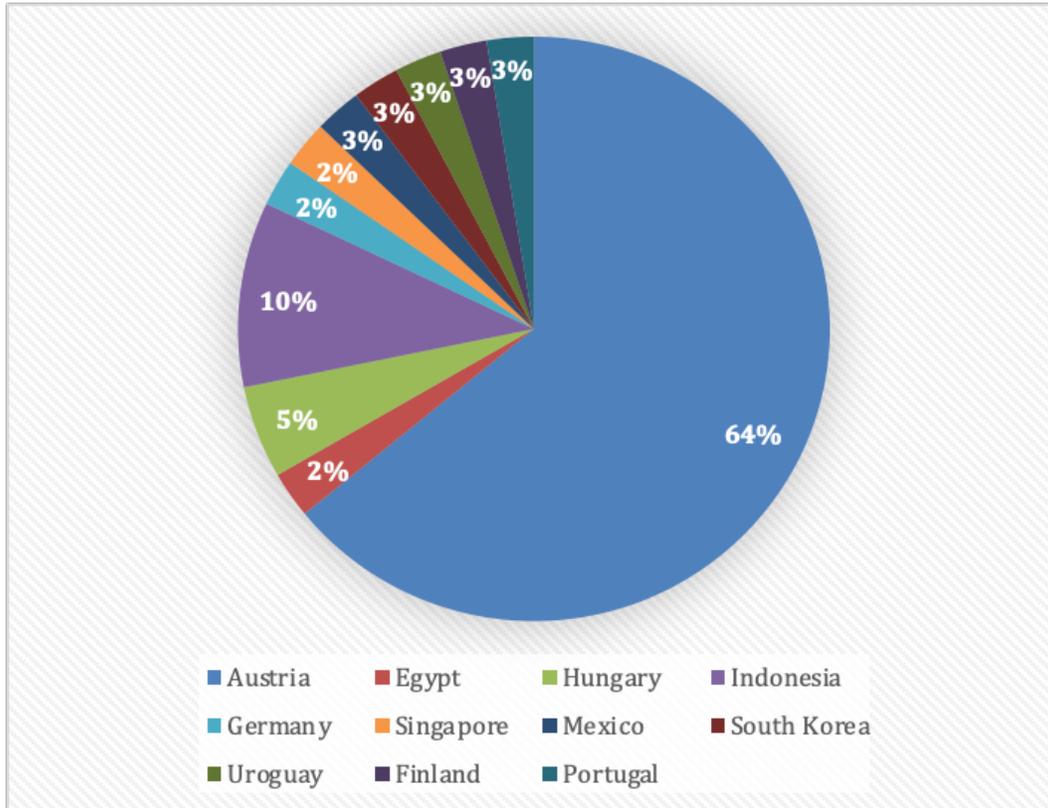

Figure 2: Demographic representation of PhD students at the Linz School of Education.

When it comes to gender representation, female doctoral students are represented by 60%, while male students are represented by 40% percent, Figure 3.
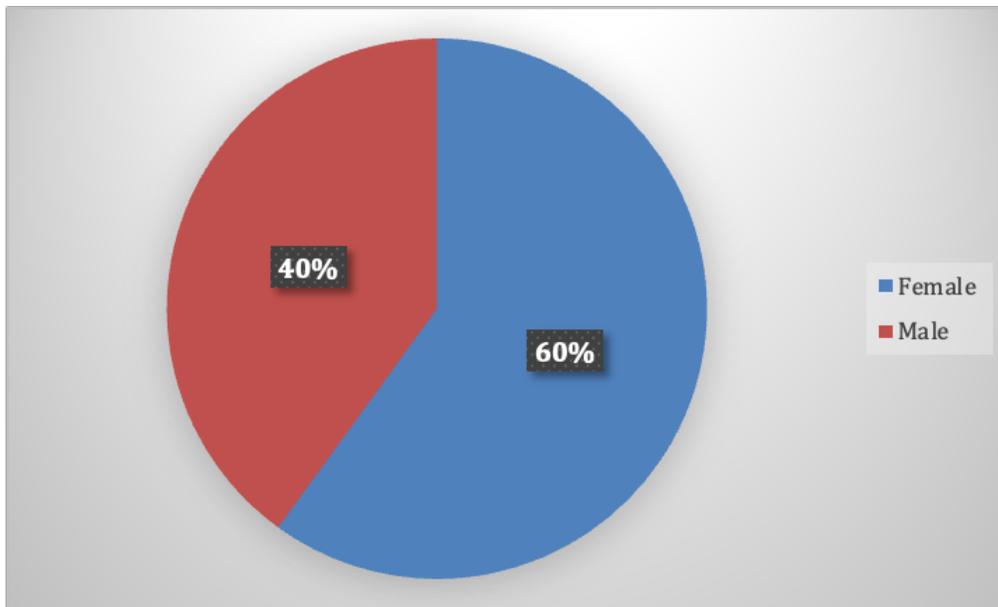
Figure 3: Gender representation of PhD students at the Linz School of Education.

The largest part of doctoral students, 72%, enrolled in doctoral studies in the field of STEAM education, while 28% of them enrolled in doctoral studies in 'General education', Figure 4.
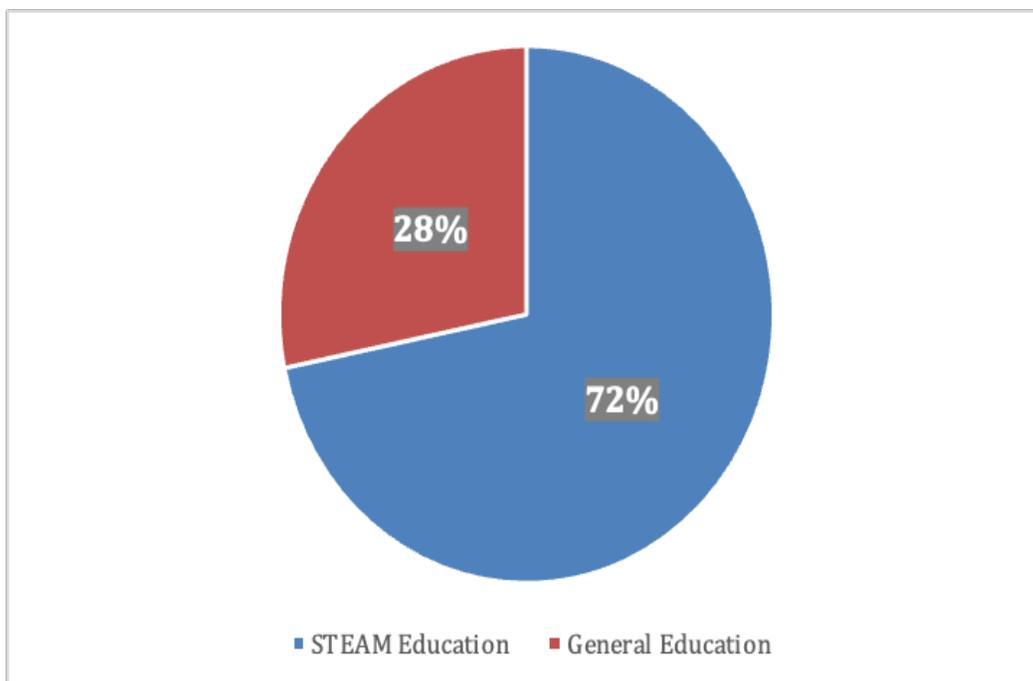

Figure 4: Data on research areas of doctoral students.

Research projects

General Education

Within the Department for Educational Research nine projects are currently being implemented. Three of these projects are funded by the EU (for instance Erasmus+). Four projects are funded by the Austrian Ministry of Education. Detailed information about the projects is presented in the table below. Within these projects, cooperation is established with more than 10 scientific research institutions from five European countries (Table 2).

No.	Project title	Project partners	Short descriptions
1	Digitalisation of the Austrian education system (DAES)	Repuco University of Krems Austrian Ministry of Education	*Funding*: European Union, technical support mechanism (TSI) *Rational*: The aim of the project is to support institutional and administrative reforms in Austria (eg., 8 - Punkte Plan) by contributing to the digitalisation of the Austrian education system. Therefore, the research project aims to develop a digital upskilling curriculum for teacher educators and implementation guidelines to ensure an aligned training approach for all Austrian teacher educators, as they play a particularly important role in the promotion of teachers', school leaders' and entire schools' competencies. The development of the upskilling curriculum is on the one hand based on a comprehensive analysis of the current situation and needs of teacher educators in Austria as well as European and international best practices for the development of digital competences of teachers and teacher educators. On the other hand, the results of stakeholder

			consultations and workshops (eg., with teacher educators of different Austrian University Colleges of teacher education; representatives of the BMBWF) as well as the development of a customised competence framework is taken into account. After a piloting phase a roadmap will be created for the implementation of the validated curriculum at the 14 Austrian University Colleges of Teacher Education.
2	Citizen Science meets Citizen Art	Circus of Knowledge Linz Institute of Technology Various schools	Arousing enthusiasm and curiosity for research and scientific discovery at an early age and encouraging young people to see themselves as changemakers and active agents is the central objective of the project. With the connection of art, science and education and the active involvement of Citizen Science (CS), there is a potential to shape sustainable education and to sustainably advance the implementation of innovative methods.In the Artistic Research at the participating schools, transdisciplinary research formats are prototypically tested with 980 pupils.Guided by mentors (representatives from the arts, science, education), the students (Citizen Artists) embark on a research journey and explore scientific topics with the means of art. This research journey includes the translation of scientific topics into theatre, dance or musical interventions that can be experienced sensually and are designed together. **Scientific Research** actively involves more than 60 pupils in the scientific monitoring of the Artistic Research formats. Could the interest in science and STEM topics be increased? What effects on general learning behaviour can be identified in the

			school context? Can socioeconomic and gender-specific disadvantages be avoided/compensated through artistic research formats? The students and teachers will be involved in the development of the research questions, the theoretical framing of the scientific evaluation of the project as well as in the data collection and analysis. This ensures a comprehensive involvement of CS in the entire research process. Qualitative and quantitative research methods are applied. Primarily peripheral schools were selected as partner schools.
3	Scientific evaluation of digitalization in Austrian schools - eEducation	PHOÖ	The initiative "eEducation Austria" pursues the goal of bringing digital and informatics competencies into all classrooms in Austria - from elementary school to maturity and diploma exams. The focus of all "eEducation Austria" activities is on the didactically meaningful use of digital media in all subjects and on increasing the digital and informatics competencies of students. The aim of this project is to carry out a comprehensive analysis of the current situation at schools, looking not only at the degree to which eEducation topics have been implemented and anchored, but also at the conditions for success and obstacles.
4	Digital literacy education in Austria	University of Krems	This research project aims to evaluate the implementation of the compulsory subject "Digital Basic Education" - which aims to promote media literacy, application skills and informatics competencies. The aim is to

			analyze the actual implementation of the subject in schools and its implications for the further development of competencies in upper secondary and vocational schools in order to foster the further development of the subject.
			On the one hand, the project will investigate how the new compulsory subject is actually implemented in schools, especially with regard to the question of what competencies the teaching staff have and to what extent they consider these competencies to be (not) sufficient. It is also of interest to know what the teachers focus on in their lessons within the framework of the curriculum, and what content, topics and target criteria are given particular importance in the subject of digital literacy.
			With regard to the development of students' competencies, test items will be used to measure competencies in the target areas.
			The introduction of this new subject also creates a changed starting position for subsequent educational institutions. Here, it is necessary to evaluate the extent to which the learning outcomes demonstrated within the framework of the compulsory subject at lower secondary level are usable and beneficial for the various types of schools at upper secondary level.

| 5 | Erasmus+ Projekt Inter Cultural Community Evaluation and Planning (ICCEP) | Dublin City University Universitetet i Oslo Pamukkale Universitesi
Consejeria de Educasíon y Empleo – Junta de Extremadura | *Funding:* European Union. Erasmus + KA2 – Cooperation and Innovation for Good Practices. Strategic Partnerships for school education
Rational: The project aims to develop a community-based planning and evaluation system, (ICCEP) where schools and other stakeholders collaborate in networks for the improvement of migration background students and a member of the network or an external body act as a facilitator and mediator during the ICCEP process. The term ICCEP means involving all stakeholders in the process of evaluation and planning. In this project, the education governance systems and the underpinning intercultural policies and documents of the participating countries will be reviewed. Teachers', school leaders' and other sectoral support agencies survey responses will lead towards developing a conceptual map of ICCEP. and the development of a framework of quality indicators and the detailed mechanism of ICCEP. Through case studies, the consortium will explore what training needs should be provided to upskill the existing competencies of members of the network. For this reason, this project includes developing a Massive Open Online Course (MOOC) and a toolkit of essential resources to plan for and integrate migrant students in communities. It will also involve training on the mechanisms required for ICCEP. |
| 6 | Erasmus+ Projekt Culturally Responsive Leadership and Evaluation in Schools (CReLES) | Dublin City University
Moscow City University
University of Salamanca | *Funding:* European Union. Erasmus + KA2 – Cooperation and Innovation for Good Practices. Strategic Partnerships for school education
Rational: In line with the current influx of migrants and refugees to Europe and the international Sustainable Development Goal of |

			inclusive and equitable education for all, this project aims to prioritise the inclusive education of students with a migration background and the school leadership that facilitates that inclusive education.
7	impakt schulleitung	IBB, PH Zug	»impakt schulleitung«, the school leadership program of the Wübben Foundation, supports school leaders of schools in challenging circumstances in the further development of their school. »impakt schulleitung« offers a comprehensive range of support to initiate a process that is tailored to the needs of the respective school. The scientific monitoring of the program is carried out by a team led by Prof. Dr. Stephan Gerhard Huber from the Institute for the Management and Economics of Education (IBB) at the University of Teacher Education Zug. Three cohorts that participated in the »impakt schulleitung« program from 2015 to 2020 in North Rhine-Westphalia were accompanied. The longitudinal study considers the different perspectives of the individual actors and groups of actors and the different levels (program, school, and person level). A mixed-method approach is chosen, i.e. quantitative and qualitative survey methods are used in combination. The research project examines support measures for school leaders of schools in challenging circumstances. It focuses on both their processes and their effects. While the focus of the impact is on the scientific examination of the impact of the program (effectiveness and sustainability of the achievement of the program's goals, i.e., results), the process focus investigates the actors of the program and the other people involved in a

			processual or continuous manner. The central goal of the research project is therefore to analyse which personnel and school development processes as well as which effects unfold among school leaders and their schools. The goal is to develop meaningful results and recommendations on how and under what conditions school leaders and schools with many students from non-educational families can be supported to improve school quality and increase the educational opportunities of disadvantaged children and youth.
8	PeSch: PerspektivSchulen	IBB, PH Zug	"PerspektivSchulen" is a program to support students and multiprofessional teams at schools in challenging circumstances in Schleswig-Holstein. Schools in a socially disadvantaged environment receive additional support through the program so that they can develop improved perspectives for themselves and their students. In addition to a financial budget totaling several million euros, the PerspektivSchulen receive support in the form of consulting, further education, coaching, training, academies and networking assistance from the Ministry of Education, Science, Research and Culture of the state Schleswig-Holstein (MBWK), the Institute for Educational Development in Schools in Schleswig-Holstein (IQSH), the Schleswig-Holstein School Supervision and the Wübben Foundation. The program is running for five years (2019-2024).

			"PerspektivSchulen" is being researched and evaluated with an accompanying study called "Work at schools in challenging circumstances in Schleswig-Holstein" by a team led by Prof. Dr. Stephan Gerhard Huber from the Institute for the Management and Economics of Education (IBB) at the University of Teacher Education Zug. The study aims to make visible the work of school leaders, teachers and educational staff at schools in challenging circumstances. Furthermore, the experiences of the schools are to be used to find indications of how and under which conditions school leaders and schools in challenging circumstances can be meaningfully supported to improve school quality and increase the educational opportunities of disadvantaged children and youth. In the longitudinal study, processes of change and development in schools in Schleswig-Holstein will be examined over a longer period to understand the conditions for success and the prerequisites for school development. Throughout the project, several surveys will be conducted to analyse the development and changes of schools and the effect of leadership development measures on the competence development of school leaders and the effect of school development measures on organisational change. Schools in challenging circumstances are to be differentiated in their complexity so that effective support measures can be offered according to need. Furthermore, questions will be answered that deal with the role of school leaders and the possibilities of

			school development for the assurance and further development of the quality of school work.
9	Integrative school - The role of school leaders, teachers and special education personnel for the development of the quality of education	IBB, PH Zug	The research project is supported by the Swiss National Science Foundation. Schools and cantons are faced with the task of initiating and implementing an integration-oriented transformation process. In the design of integrative practice, concepts (e.g., regarding staffing, resourcing, the definition of special educational needs, requirements for school leaders) and structures diverge despite the harmonisation of the cantonal school systems. Central "change agents" in these school development processes are the school leaders. The study aims to analyse cantonal (in the German-speaking cantons of Switzerland) and school-specific requirements and resources as well as quality characteristics. At the cantonal level, these include legal requirements, conceptual considerations, qualification possibilities, support offers, and equipment options. At the school level, these are input, throughput and output quality characteristics and their interrelationships, in particular attitudes and competencies (as characteristics of professionalism), coordination of action and cooperation in the school team (as characteristics of school quality) and professional action in teaching and education (as characteristics of implementation) regarding the design of integrative practice in schools. The legal requirements, conceptual considerations and available resources are to be analysed by means of document

			analysis. These results will serve as a basis for the quantitative questionnaire survey and as a contextualization of the quantitative results. The quantitative analyses are based on online surveys of school leaders, teachers, and special education personnel and, where appropriate, statistical information about the schools, on aspects of school quality.
			One objective of this study is to look at and link the two fields of research on school quality, school development and school leadership on the one hand and on integration on the other hand in Switzerland.
			The expected results will provide empirically supported insights into the development of integration in schools. In addition to the scientific knowledge potential, the study promises relevant development impulses for educational policy, school administration and school supervision as well as the pedagogical leadership practice of schools.

Table 2: Research Projects of the General Education Research Group

In addition to these externally funded research projects, a number of self-funded research and publication projects on the topics "Learning losses due to COVID-19 related school closure - A meta-analysis", "Distance learning during Corona - A representative parent and student survey", "Professionalization process of prospective teachers - A longitudinal student survey", "We want to know how our students' skills are doing! - A longitudinal study on the use of learning progress assessment (LPA) in primary school." are conducted at the Department of Educational Research. Both externally and internally funded research projects provide multiple opportunities for PhD candidates to access existing data to conduct secondary analyses or generate subsequent follow up research projects.

Mathematics and STEAM Education

Within Linz School education- Mathematics and STEAM Education department 13 projects are being implemented. Twelve of those projects are funded by Erasmus plus the EU programme for education, training, youth, and sport. One project is founded by HORIZON-WIDERA action. Detailed information about the projects is presented in Table 3. Within these projects, cooperation is established with more than 40 scientific research institutions from 19 European countries.

No.	Project title, webpage and logos :	Project partners:	Short descriptions:
1	PUNTE Project http://www.punte.eu/ 	· POLY-UNIVERSE Ltd · University of Coimbra · J. Selye University · Johannes Kepler University Linz · Universitate a Crestina Partium	The aim of our project is to develop, test and disseminate new innovative, deeply trans-disciplinary pedagogical methods in teacher training of the fields of STEAM and beyond. Based on a recently developed Poly-Universe tool we intend to build a new, module-based educational framework of improving disciplinary and transversal skills of future teachers, and stimulate a.

| 2 | STEAM-BOX: Courses, Tools, Resources for Teachers
http://steamboxproject.eu/ | · Kaposvár University (Hungary)
· Hacettepe University (Turkey)
· Johannes Kepler University (Austria)
· University of Jyväskylä (Finland)
· Paydas Egitim Kultur (Turkey) | Transdisciplinary integration of STEAM fields in the learning process is an emerging concept. This growing phenomenon took its part in many educational policy reports, including new skills and key competencies that needed to have in the knowledge century. Although recent study highlights the need for integration, there is still a gap in the field of implementation. Relevant literature indicates that to transfer the theory into practice 1) knowledge, skills, and experience of teachers 2) infrastructure, platforms, and tools, 3) educational resources are some of the most important factors in the integration process. In this project, four intellectual outputs (IO) and five multiplier events (ME) are planned to serve these factors. The target group will be teachers, in some cases prospective teachers, teacher educators, researchers, and students. In the frame of the project, it is expected a minimum 500 participants will be first-degree beneficiary through IOs and MEs during the project. |

| 3 | Upgrading pre- and in-service teachers' digital skills with online STEAM hands-on training modules https://eduspace.tlu.ee/en/steamupgrade-partners/ | · Tallinn University (TLU)
· University of Jyväskylä's (JYU) Finnish Institute for Educational Research
· The Rey Juan Carlos University (URJC)
· Johannes Kepler University Linz (JKU)
· University of Stavanger (UiS)
· Crafbot
· Maxwhere | This project is addressed to a target group composed of pre- and in-service teachers, and teacher students (students enrolled in Education degrees), from three different levels: early childhood, primary and secondary education. The project main goal is to create an environment aiming to strengthening the STEAM skills of our target group. This environment will help reverse the situation described above, enabling our target group to use, design, develop and integrate STEAM-related activities into their everyday classroom activities. For that, the project activities include the generation of training material for teachers. Additionally, the project envisages the elaboration of a set of design guidelines about how to improve teacher involvement with respect to STEAM-related concepts and activities, a virtual laboratory and a repository of educational material, together with the organisation of a number of pilot tests and dissemination activities. Regarding results, this project will have a strong impact on the educational system through the incorporation of digitally-skilled teachers to present schools. |

| 4 | STEAM PLUS https://steampluseu.org/#the-project | · Erzurum Technical University · Experience Workshop · Erzurum Maturation Institute · Johannes Kepler University | Adopting the principle of "leaving no one behind", the STEAM PLUS project aims to contribute to sustainable development with a holistic approach. Skills possessed by adults must be adapted and developed to the needs of today's world, which is constantly evolving and transforming. The main motivation of the project is to provide inclusive and quality education and to promote lifelong learning opportunities. Adaptation of adult individuals to technology and scientific facts in the digitalized world brings with it some problems in terms of time, cost or living conditions. Especially adults who have not received formal or non-formal technical education have difficulty in adapting to this process. The pandemic experienced on a global level has once again shown that these difficulties must be overcome and that humanity needs more creative thinking and behaviour. |

5.	STEAM+ https://www.steamtalent.eu/ STEAM+	· Hanze UAS (HEI) · University of Oslo · Johannes Kepler University Linz · University of Iasi · University College Copenhagen · Klaipeda University (KU) · University of Munster · Ca'Foscari University of Venice (UNIVE) · KU Leuven · University of Antwerp (HEI) · RE:EDU (Company)	Innovating STE(A)M in Higher Education with Transdisciplinary Talent Programs (STEAM+) is a large-scale innovative project with a holistic approach, aiming to provide educational policy makers with instruments to prepare new generations for handling the challenges of our time. It is supported by the EU's Erasmus+ program in Key Action 3 (support for policy reform), as a Forward-Looking Cooperation Project.
6.	STEM CONNECT https://steamconnect.education/about/ STEAM CONNECT	· Experience Workshop · University of Luxembourg · University of Torino · Comenius University in Bratislava · Johannes Kepler University	The STEAM-Connect project aims to connect teachers, parents, artists, pedagogues and researchers from different disciplines to develop innovative transdisciplinary workshops and pedagogies together to enhance collaborative STEAM teaching and learning for secondary school students of all abilities and backgrounds.

7.	MATH-DIGGER - MATHematics DiGital Escape Rooms https://erasmus-plus.ec.europa.eu/projects/search/details/2021-1-PT01-KA220-HED-000032234?fbclid=IwAR2Pz-N8waxTB5b_-D2CBALvd6Z4yvM8olWxyCE3DtdPfGmpV6A57ieFrMl	· Elliniko Mesogeiako Panepistimio · Hacettepe Universitesi · Instituto Politecnico De Coimbra · Letterkenny Institute Of Technology · Mistems Innovation And Services Ltd. · Universitat Linz	The MATH-DIGGER project - MATHematics Digital Escape Rooms platform enables all partners to increase the quality and relevance of their activities, to develop and reinforce their networks of partners, to increase their capacity to operate jointly at transnational level, boosting internationalisation of their activities and through exchanging or developing new practices and methods as well as sharing and confronting ideas. The way to achieve this is by the development of MATH-DIGGER, as a free tool to maximise students' enjoyment, engagement and motivation in their learning process. The partners will propose and share exciting exercises and problems, mostly based in real world problems, and these will be solved by students in a virtual reality framework at MaxWhere. This virtual environment elevates the digital experience by stimulating the 3D awareness of the brain in a unique manner. We intend to move swiftly towards 'game-based learning'.
8.	Colette- Computational Thinking Learning Environment for Teachers in Europe https://colette-project.eu/	· Goethe University Frankfurt · University of Potsdam · Johannes Kepler University Linz · Utrecht University · Univerzita Konstantina Filozofa Nitre · Université Lyon · Autentek GmbH	The idea of this project is to develop a learning environment which can be used to teach and learn CT independently from the socio-economic background of the students and schools. Approaches to CT using hardware and modern technology (e.g. robots, 3D-printers) can be very motivating for students. However, there are many practical reasons such as the costs, safety concerns and the availability of the tools to only a small group of students at a time

			outweighing their possible benefits.
9.	Free-ED https://free-ed.eu/ 	· University of Jyväskylä · The House of the Teaching Body from Miercurea Ciuc · Tallinn University · Johannes Kepler University	The aims of the project are: to define a framework for hybrid education (combining classroom learning with web-based distance learning) in lower secondary schools, to collect and share the best technology-supported education practices in the project countries: Austria, Estonia, Finland, and Romania, to help lower secondary teachers develop their reflective practice and their digital and pedagogical competencies, to provide recommendations to education technology developers.
10.	STEAM Teach https://www.steamteach.unican.es/ 	· University of Cantabria · Johannes Kepler University Linz · University of Jyvaskyla · National and Kapodistrian University of Athens · Budapest Metropolitan University	Our objectives for the project are to: Design a Transcultural Professional Development Framework Use the framework for developing and implementing Teachers' STEAM Training Course Programmes Test the local and trans-cultural effectiveness of these STEAM programmes by assessing the instruction of our trained teachers in their classrooms with students

| 11. | Authomath https://www.authomath.org/ (logo and webpage are in developing phase) | ● Pädagogische Hochschule Heidelberg
● Johannes Kepler University
● The University of Edinburgh
● University od Cantabria | During the pandemic crisis in 2020/21, schools and teachers have understandably turned towards quick and easy solutions for managing the unpredicted challenge of distance learning. In earlier times of digitising classroom teaching, this practice has been described as migratory, for example, uploading scans of traditional paper material to learning platforms for download. However, it is the transformative approach that is needed for a genuine digital transformation of educational practices, as this means exploring the full potential of digital media and tools for meaningful and effective teaching and learning. In the area of mathematics, among the affordances of digital media that evidently lead to meaningful and effective teaching and learning are multimodality, dynamization and interactivity. Another specific digital potential is the use of automated adaptive feedback to relieve teachers from checking the very same exercise solutions repeatedly and addressing the same misunderstandings, again and again, thus allowing more time when help is really needed. In fact, with GeoGebra and STACK there are well-known authoring tools for creating digital learning material, each with specific features for creating multimodal dynamic and interactive applets and randomised tasks with adaptive feedback. What is missing is a tool that combines the strengths of both for an authoring tool that is accessible enough for inservice teachers and makes use of the full potential of digital media in |

			mathematics teaching and learning.
12.	TransEET TRANSFORMING EDUCATION WITH EMERGING TECHNOLOGIES (logo and webpage are under development)	· Ethniko Kai Kapodistriako Panepistimio Athinon · Stichting Hogeschool Van Amsterdam · Johannes Kepler Universitat Linz · Università Degli Studi Di Torino · University College London,	The 'Transformation in Education with Emerging Technologies' (TransEET) project addresses Education, a Social Sciences and Humanities (SSH) research domain also requiring expertise from Computer Science and the design and development of specialised custom and original digital media as tools in educational practice. It is a domain that has a lot to gain from twinning and sustainable synergies between institutions and research teams with complementary expertise and TransEET will develop and adopt a special method for productive twinning. Envisioning and shaping the future of learning in the digital era is a persistently illusive endeavour requiring sustainable integrated research and innovation approaches to the problem.
13.	MathSkill Testing	JKU, University of Krems	MathSkill Testing - Test your math base "MathSkill Testing" is about the development of an innovative quiz environment and suitable tasks to be able to estimate in advance how broad the basis for studying mathematics or studying the natural sciences has already been laid. With an initial assessment, you save yourself the shock that some experience in the first year of study and can compare your self-assessment with the study requirements. Check your math

			skills and check which parts you are already doing well and where you still have some catching up to do.
14.	Interactive DigiClasses	JKU	Development of a new type of digital real-time course system Due to the Corona regulations, the more than 3,000 employees of the JKU also face special challenges, as all courses and personnel development courses are currently being held virtually. Therefore, as part of this project, a new digital real-time course system is to be developed together with employees of the JKU Linz to better support interactive course formats. This digital tool is intended to imitate a virtual lecture hall, to support cooperation with course participants in a simple way and at the same time to simplify the organizational effort of the teacher with the help of digitization.

Table 3: Research Projects of the STEAM Education Research Group

Computer Science Education

No.	Project title, webpage and logos :	Project partners:	Short descriptions:
1	**Girls Only 10/2021-12/2022** **Girls Only – WIN-SE (jku.at)**	MUL, University of Passau	The aim of the Girls Only project is a complete program of STEM support measures with a focus on computer science and computational thinking for girls and young women of all ages. The basic idea of promoting women in the STEM field will be taken up further in the follow-up project Let IT Dance from 2023-2024.
2	**Let IT Dance 11/2022 - 12/2023**	CreaMoS - Verein zur Förderung digitaler Bildung und Gesundheit	The aim of the project is to attract girls and young women to IT and to visualize computer science topics by dancing In Let IT dance, IT and MINT topics are conveyed through dance, music and theatre performance

3	**Educating Talents** **10/2022-2025**	Wallonie Bruxelles Enseignement, APRECA, Bildungsdirektion Oberösterreich, Stichting Christelijk Regionaal, Opleidingen Centrum Noord- en Oost Nederland Netherlands Groningen, BIZNESA MAKSLAS UN TECHNOLOGIJU AUGSTSKOLA RISEBA Latvia Rīga, L'Envol	Starting from the fact that in our 6 countries, there are learners who have intellectual, artistic, entrepreneurial, technological, relational potential, etc. that they are unable to develop for lack of challenges, we want to empower teachers to prevent learners from becoming bored, underperforming or even dropping out of school. These strategies will give talented learners the opportunity to reach their potential, and become capable of creativity and innovation for the greater benefit of Europe. We will create a community of practice around this theme, and the final product will be an interactive eHandbook containing, in addition to good practices, strategies for identifying talented students, combining high potential with learning difficulties, as well as strategies to improve awareness among educators that talented learners have special needs that must be taken into account.
4	**DigiFit4All** **03.2020 - 02.2024** **DigiFit4All	Linz School of Education (jku.at)**		Digital skills are essential for all citizens in the 21st century. This project therefore aims to digitally impart these necessary "digital skills" in 5 pillars, including to students of all fields of study, teachers and pupils.
5	**COOL Informatics** **09.2019-.12.2020** **Cool Informatics	Linz School of Education (jku.at)**	Innovation Foundation for Education & OEAD	As part of the project (Innovation Foundation for Education & OEAD) we show with our interdisciplinary materials, which are designed in an appealing and understandable way according to the findings of neurodidactics, that basic digital education and programming is COOL. In this way, computer thinking can be easily and integratively implemented

			in various subjects from elementary school to high school. The end products of the COOL Informatics project are two interactive and dynamic GeoGebra books, in which pupils and teachers as well as students are addressed as a target group.
6	**CoTalent** **12/2020 - 12/2021** **CoTalent | Linz School of Education (jku.at)**		Within the framework of the international CoTalent project (Erasmus+ Key Action 2), tools for promoting talent in secondary and tertiary education were developed. The MeTalent-Mirror allows teachers to evaluate their own views on gifted education, the YouTalent-Spotter helps to identify gifted students and the e-library consists of texts, images and videos to support teachers in research-based gifted education.
7	**INTERREG Austria-Bavaria (CROSS-BORDER PROMOTION OF COMPUTER EDUCATION)** **09/2018 - 12/2019** **Interreg Germany/Bavaria - Austria • Interreg.eu**	University of Passau	The focus of the project is the conception, implementation and use of a "computer case", a selection of learning materials related to computer science, which should enable simple, mobile and uncomplicated introductory events on the subject of computer science for children from 1st to 8th grade. offer school level. All partial aspects are implemented jointly by the Johannes Kepler University Linz (JKU) and the University of Passau (UP).
8	**Modeling at School (MAS)** **01.11.2018-31.08.2021** **Modeling at School | Linz School of Education (jku.at)**		This Erasmus+ project brings computer modeling as a creative teaching and learning strategy to all school levels and subjects and thus promotes the students' computational thinking skills. With the advanced training model developed, innovations

			can be made accessible to a broad audience.
9	**Diversity in programming education (DIPE) 06/2020 - 03/2022** [DIPE: Closing the Gaps – Diversity in Programming Education – WIN-SE (jku.at)](#)		The aim of this project is to develop a didactic concept for programming training that promotes individuality and inclusion in order to actively support different dimensions of diversity.

Table : Research Projects of the Computer Science Education Research Group

Supporting activities

LSEd is engaged in a wide range of other supporting activities that add to the education and scientific development of its students and staff. In this section we outline the lists of visiting scholars and students, conferences and workshops organised, and planned activities of LSEd as well as our involvement in international conferences and events.

Visiting scholars

- Prof. Hans-Georg Weigand, University of Wurzburg, Germany
- Prof. Eleonora Faggiano, University of Bari, Italy
- Prof. Mara Alagic School of Education, Wichita State University, USA
- Prof. Noah Dana-Picard Jerusalem College of Technology, Israel
- Prof. Selay Arkun Kocadere Hacettepe University, Turkey
- Prof. Jose-Manuel Diego-Mantecón University of Cantabria, Spain
- Prof. Benjamin Rott University of Cologne, Germany
- Prof. Irina Lyublinskaya Teachers College of Columbia University, USA
- Prof. Celina Abar, Catholic University of Sao Paulo, Brazil
- Prof. Christhoper Brownell, Fresno State University, USA
- Prof. Sencer Corlu, University of Oslo, Norway
- Prof. Roman Hasek, University of South Bohemia, Czech Republic
- Prof. Lilla Korenova, Comenius University, Slovakia
- Prof. Judit Robu, Babes Bolyai University, Romania

- Prof. Peter Kortesi, University of Miskolc, Hungary
- Prof. Ornella Robutti, University of Torino, Italy
- Prof. Pamela Burnard, University of Cambridge, UK
- Prof. Andreas Styliniades, University of Cambridge, UK
- Dr. Carla M.A. Pinto Polytechnic Institute of Porto, Portugal
- Dr. Adi Nur Cahyono Universitas Negeri Semarang, Indonesia
- Dr. Kristof Fenyvesi University of Jyväskylä, Finland
- Dr. Houssam Kasti Qatar university, Qatar
- Dr. Yves Kreis University of Luxembourg, Luxembourg
- Dr. Filiz Mumcu Manisa Celal Bayar Üniversitesi, Turkey
- Dr. Janika Leoste, Tallinn University, Estonia
- Dr. Reka Szasz, Budapest School of Mathematics Education, Hungary
- Prof. Dr. Jürgen Baumert, German Institute for Educational Research, Germany
- Prof. Dr. Stefan Brauckmann-Sajkiewicz, University of Klagenfurt, Austria
- Prof. Dr. Charalambos Y. Charalambous, Cyprus University, Cyprus
- Prof. Dr. Denise Demski, Ruhr-Bochum University, Germany
- Prof. Dr. Johanna Fleckenstein, IPN Kiel, Germany
- Prof. Dr. Alexander Gardner McTaggart, University of Manchester, England
- Prof. Dr. Stephan Gerhard Huber, PH Zug, Switzerland
- Prof. Dr. Nele Nicole Kampa, University of Vienna, Austria
- Prof. Dr. Harm Kuper, Humboldt-University of Berlin, Germany
- Prof. Dr. Hilbert Meyer, University of Oldenburg, Germany
- Prof. Dr. Florian H. Müller, University of Klagenfurt, Austria
- Prof. Dr. Petros Pashiardis, Open University of Cyprus, Cyprus
- Prof. Dr. Alberto Piatti, Scuola universitaria professionale della Svizzera italiana, Switzerland
- Prof. Dr. Rick Mintrop, Berkeley University, USA
- Prof. Dr. Guri Skedsmo, PH Schwyz, Switzerland
- PD Dr. Rolf Strietholt, IEA Hamburg, Germany
- Prof. Dr. Marie-Christine Opdenakker, Utrecht University, Netherlands
- Prof. Dr. Albrecht Wacker, PH Ludwigsburg, Germany
- Prof. Dr. Julia Warwas, University of Hohenheim, Germany
- Prof. Dr. Beate Wischer, University of Bielefeld, Germany
- Prof. Dr. Steffen Zitzmann, University of Tübingen, Germany
- Prof. Dr. Jan Hochweber, PH St. Gallen, Switzerland
- Dr. Loredana Michalca, Babeş-Bolyai University, Romania
- Dr. Dagmar Heuling Schulz, University of Erfurt, Germany
- Prof. Dr. Marcela Pozas, Humboldt-University of Berlin, Germany

Exchange students

The following international Ph.D. students stayed as visitors as research at Linz School of Education during the past year:

- Andreas Datzmann, Passau, Germany
- Ayla Crvalho, Brasil
- Balazs Koren, Budapest, Hungary
- Binbo Sun, Beijing, China
- Bjarnheiður Kristinsdóttir, Reykjavik, Iceland
- Bruno Leite, Sao Paulo, Brazil
- Cecilia Russo, Montevideo, Uruguay
- Daniel Katona, Budapest, Hungary
- Eduardo Pompermayer, Porto Allegre, Brazil
- Emilia Fazzino, Catania, Italy
- Fabian Vitabar, Montevideo, Uruguay
- Fernanda Martins da Silva, Brasil
- Gergely Szmeka, Budapest, Hungary
- Giulia Bini, Torino, Italy
- Hülya Yaşar, Turkey
- Ingi Hojsted, Copenhagen, Denmark
- Jiri Blazek, Ceske Budejovice, Czech Republic
- Jose Ronaldo Araujo, Brasil
- Kalman Bekesi, Budapest, Hungary
- Lajos Sebestyen Szabo, USA
- Laura Del Rio, La Plata, Argentina
- Natalia Budinski, Belgrade, Serbia
- Renata Vagova, Nitra, Slovakia
- Roi Shillo, Tel Aviv, Israel
- Veronika Havelkova, Prague, Czech Republic
- Zaira Ortiz, Spain

Conferences Organised

In the past eight years, 25 conferences have been organised within the STEAM education department. Which is particularly important to highlight the 12th YERME Summer School, where 100 doctoral students from all over Europe participated face-to-face. Full list of conference is given bellow:

Mathematics and STEAM Education
- 12th YERME Summer School YESS-12: August 22-27, 2022
- CADGME 2022: Digital Tools in Mathematics Education 12-14 September, 2022.
- Fun STEAM-Solutions for Societal Challenges: 9th-13th of May 2022
- Arts in STEAM 2022 Conference 20-22. January 2022

- Doctoral Students' Conference: Tradition, Development & Innovation in Didactics - Early Career Researchers (TDID-ECR):2-3 December 2021
- CADGME - Digital Tools in Mathematics Education Online Gathering 2020: June 23rd, 2020
- Doctoral Students' Conference: Tradition, Development & Innovation in Didactics (TDID): 14-16 May 2020
- Pedagogical Innovations in STEAM Education Conference - Action Research and Academic Writing Workshops 16-17 January 2020
- Innovations in STEAM Education and Design Research Conference: 9-10 May 2019
- Linz Gamification and Creativity in STEAM Education Conference: 17-18 January 2019
- Cambridge Mathematics Symposium 2018-JKU Linz Site Contribution
- Linz Creativity in STEAM Education Conference: 19-20 April 2018
- Linz STEAM Education Conferences in 2017-18
- Linz STEAM Education Conference: 18-19 January 2018
- 2017 - Linz STEM Education Conference: 18-19 May 2017
- 2016 - Linz STEM Education Conference: 12-13 January 2017
- 2016 - STEM Education Research Day - June 2016
- 2016 - Research Methods 2: Introduction to data collection, analysis, and reporting in
- 2016 - STEM Education Research Day, 1. Apr 2016
- 2015 - STEM Education Research Seminar, 7.-8. May 2015
- 2015 - MATH Education Course, 9.-10. Apr 2015
- 2015 - STEM Education Research Seminar, 5.-6. Mar 2015
- 2014 - STEM Education Research Seminar, 4.-5. Dec 2014
- 2014 - STEM Education Research Seminar, 29.-30. Sep 2014
- 2014 - STEM Education Research Seminar, 10.-11. Jul 2014

Computer Science Education
Colette conference planned 17-19.7.2023

Workshops Organised

In addition to the conferences organised by the STEAM research department, the department for educational research organised several workshops on methods in educational research with particular focus on Phd projects:

- VASOM (Vienna Autumn School on Methods), AG 9: Introduction to advanced quantitative research methods, Sep 2022
- LAQM-Workshop "Instruktionssensitivität als Aspekt gültiger Testwertinterpretation in der Erfassung der Wirksamkeit von Unterricht", June 2022
- LAQM-Workshop "Measuring Human Values in Practice: Forcierung valider Messungen individueller Wertorientierungen", March 2022
- Workshop "Maschinelles Lernen kurz erklärt: Eine Einführung für Psychologie und Bildungswissenschaften", March 2022

- LAQM-Workshop "Motivationsanalysen in einem between-subjects ATI Forschungsdesign", Nov 2021
- LAQM-Workshop "Der Beitrag von Praktika zum Professionalisierungsprozess von angehenden Lehrer/innen", Nov 2021
- Workshop "Einführung in Stichprobenziehung und Gewichtung mit R.", Sep 2021
- LAQM-Workshop "Ranking vs. Rating von Erziehungszielen", June 2021
- LAQM-Workshop "Korrektur von Antworttendenzen. Effekte auf die Kriteriumsvalidität", June 2021
- LAQM-Workshop "Data Envelopment Analysis (DEA)", March 2021
- LAQM-Workshop "Schulen im 3. Lockdown. Merkmalsrepräsentative Elternumfrage in Österreich", March 2021
- LAQM-Workshop "Signifikanz vs. Relevanz - Eine Annäherung", Nov 2020
- LAQM-Workshop "Dynamische Messmodelle Leistungsvermögen vs. gegenwärtige Leistung und Leistungsentwicklung", Nov 2020
- LAQM-Workshop "Taugt die aggregierte Delinquenzrate einer Schulklasse als Maßzahl für die Bestimmung kriminogener Peer-Effekte? Ausgewählte Probleme und Lösungsmöglichkeiten", Jan 2020
- LAQM-Workshop "Probleme bei der Validierung von mittels Individualebenen-Ratings gemessenen Clusterebenen-Konstrukten", Jan 2019
- LAQM-Workshop "L2 irregular verb morphology. Exploring behavioural data from intermediate English learners of German as a Foreign Language", Apr 2018
- EERA Summer School 2017 "Methods and Methodology in Educational Research"
- EERA Summer School 2016

Computer Science Education - COOL lab Workshops and Events

JKU COOL Lab Offers for schools, teachers, and school classes. On the JKU COOL Lab webpage we provide numerous online workshops that teachers and school classes can carry out at home or in distance learning without instructions. All workshops can also be held as further training events (SCHILF, SCHÜLF).

We provide the following workshops:
- Clear the Ring for IT
- Let IT dance!
- Animaker
- CSI:Informatik
- Micro:bit
- Computational Thinking & Modellierung
- Mitmachen: COOL Informatics
- Digitale Grundbildung ist COOL
- Programmieren ist COOL
- Verschlüsselung
- Logik
- Learning Apps

- Game Based Learning
- Entity Relationship (ER) Diagramme
- Klassen- und Objektdiagramme
- Aktivitätsdiagramme
- Modellierung
- Digitale Grundbildung: Computational Thinking
- Einführung in Scratch
- Ozobot and Beebots

Further training opportunities for gifted students

COOL Mini Club* (7-10 years): Wednesday, 3:30 p.m. – 5:30 p.m., fortnightly
The Mini Club is dedicated to a wide variety of topics from the MINT area (mathematics, computer science, natural sciences and technology). The students get insights into a wide variety of topics and can carry out experiments themselves. In the COOL Mini Club of the JKU, schoolchildren can pursue questions from the natural sciences and contribute their own ideas, implement individual proposed solutions and develop creative products that they present to friends, relatives and the public at a celebratory closing event.

COOL Talente Club* (10-15 years): Thursday, 3:30 p.m. - 5:30 p.m., fortnightly
Each Talente Club has a special motto that represents the starting point for very special products. The topics come from the fields of mathematics, computer science, natural sciences and technology. Supported by students from the JKU, who work together with the participants in small groups in both German and English on projects of their own choice. These will be announced at the beginning of the club. All Projects are presented at the closing event.

COOL Girls Only: IT-Club* (Girls; 7-10 years): Wednesday, 3:30 p.m. – 5:30 p.m., fortnightly
The Girls Only: IT-Club is dedicated to girls, who get to know Computer Science playfully. The students get insights into a wide variety of topics in Computer Science and can carry out code programming and experiments themselves. Also, they try out some basic Computational Thinking tasks and contribute their own ideas, implement individual proposed solutions and develop creative products that they present to friends, relatives and the public at a celebratory closing event.

Further training opportunities for teachers
Currently, many schools are faced with the challenge of implementing the new curriculum "Digital Basic Education" integratively or as a subject. It is important to us to support the teachers in the implementation and have therefore developed a training course in which they can participate flexibly and from any location. As part of this online training, we would like to present teachers with a new teaching and learning strategy with which teachers can easily and effectively implement digital basic education in any subject, not only with technical aids, but simply with pen and paper. We will show teachers step by step how to use computational diagrams (modelling) as a visualisation tool and thus train computational thinking of the students.

Additional Workshops & Events organised by the JKU COOL Lab

These workshops were organised, held and investigated in several PhD-Projects with support of the JKU COOL Lab

- 2018-03-14: Lecture eMadrid (Netzwerk eLearning und Forschung, alle Universitäten in Madrid)
- 2018-04-13: Lange Nacht der Forschung
- 2018-06-12: Children's Congress
- 2018-06-29: Abschlussveranstaltung zum Jahr der digitalen Bildung
- 2018-09-17+18: Orientierungstage für BHS-Klassen 162 SchülerInnen + 10 LehrerInnen
- 2018-10 COOL Multiplikator*innentreffen Innsbruck
- 2018-11-15+16 eEducation Fachtagung COOL Lab Workshop & Keynote
- 2019-06-04: Children's Congress
- 2019 Keynote Indays Innsbruck Informatik + COOL = COOL Informatics, ein flexibles Unterrichtskonzept nicht nur für den Informatikunterricht
- 2020-05-27: Workshop - Ministry of Education: the advantages of modeling for vocational schools
- 2020-08-31: Game Design Challenge online competition
- 2021-02-21: Teacher training workshop Kollegium Aloisianum (COOL Lab Partner School)
- 2021-07-03: ECHA Lehrgang-Begabungsförderung in der Praxis
- 2021-07-10: Diagram Guru Challenge
- 2021-09-15: LIT Lecture
- 2021-09-21: Talente Oberösterreich staff workshop
- 2021-09-23: IMST Fachtagung
- 2021-10-20: IMS Stockerau teacher training workshop
- 2022-06-13: BRG Steyr Polyuniverse and CT in biology education workshop
- 2022-06-20: BRG Steyr Polyuniverse and CT in physical education workshop
- 2022-07-04: Girls* Only internal networking meeting
- 2022-08-29: Clear the Ring for IT - CT and IT for Elementary and Primary school
- 2022-08-30: Beebots and Ozobots for Elementary School
- 2022-08-30: Ozobots: Storytelling in Elementary School- Once Upon A time There was an Ozobot
- 2022-10-12: Draw-O-Bot Workshop with colette webpage for secondary school students
- 2022-11-09: Girls* Only networking meeting

Conference presentations

PhD students of LSEd delivered over 300 presentations at local and international conferences.

Sustainability and future developments

As described above the PhD programme LSEd is gaining momentum and achieved substantial progress in research and in the training of future academics. In addition, LSEd is gaining international attention and reputation shown by the visits of a large number of international academics and students as well as LSEd has already emerged in the International University subject ranking for 200-151 worldwide, third place in Austria, place just behind the Universities of Vienna and Graz. To ensure its growth in research, doctoral training, and academic achievements (conferences, publications) LSEd must secure future PhD, Postdoc and academic positions to be able to cater for its growing number of PhD students and research portfolio. This is aimed to be achieved by applying for external funding for research projects (e.g. FWF, BMBWF, Erasmus+, Horizon, Marie Curie, ERC) as well as local support at JKU. LSEd is aiming to keep the momentum of growth in educational research and PhD training, but at the same time to ensure quality instruction and research, but it would necessitate additional financial resources both external and internal. The international character of the LSEd Doctoral Programme turned out to be a great success and a substantial contributor to its high-quality research. We aim to extend this international character through participation in projects worldwide, however, we have started to set up joint PhD training and possibly joint doctoral programmes with numerous institutions. For instance, through a Horizon Widera programme, we are developing joint PhD courses with the National and Kapodistrian University of Athens, Greece and currently applying for joint doctoral training with Tallinn University, Estonia. In addition, we are organising joint PhD events with the University of South Bohemia, Czech Republic and Babes Bolyai Univesity, Romania. As LSEd is hosting numerous students from South America and several countries such as Uruguay, Argentina and Chile are at the forefront of the digitalisation of education as they have been equipping students and teachers with laptops for over 15 years we aim to develop further collaboration with institutions in these countries. In February 2023, we will start a doctoral summer school in Argentina and hope to attract further talents to LSEd and on the long term set up joint doctoral training and research project with institutions.

Within Austria, at the beginning of October 2022, the Austrian Ministry of Education launched a call for proposals inviting consortia between universities and universities of teacher education to establish joint doctoral training in the field of educational research. The call for proposals "Educational innovation needs educational research" of the BMBWF and the Innovation Foundation for Education (ISB) addresses universities and universities of teacher education (PH) with a total amount of 8.8 million euros. The aim is that this support for young doctoral students will enable research to be conducted into very urgent challenges for school teaching and social issues, and that the results will then be incorporated into everyday school practice and into teacher training and continuing education. Each consortium can apply for up to 6 PhD positions that are funded for three years. Currently, LSEd is involved in four consortia (school development, digitalization, out-of-field teaching, and early school leaving). In case of acceptance of only one of these proposals, the LSEd would be able to provide 3 PhD positions, which fit excellently into the existing formal, substantive and research methodological structure of the PhD in Education.

In addition to this doctoral programme, Herbert Altrichter in cooperation with representatives from University of Klagenfurt, University of Oldenburg, and University of Bielefeld just started to organise a joint PhD programme in Action Research. This program allows us to meet the increasing need and interest of teachers to conduct PhD level research in the field of their own professionalisation.

Another direction in which the sustainable development of doctoral studies will be planned is the connection of research with industry. Closer cooperation between PhD students from LSEd and EdTech companies in Austria and Europe is planned. The goal of the cooperation is for doctoral students to develop an entrepreneurial spirit and acquire the skills needed to present their research ideas and experiences on the EdTech market. On the other hand, it is planned that PhD students will assist EdTech companies to improve their products. Achieving this goal is planned through the exchange of PhD students and employees in EdTech companies. The preparation of a project that will stimulate this idea is underway, in which the consortium includes: the University of Tallinn, Universidad Rey Juan Carlos, campus de Móstoles, Spain, University of Novi Sad, Serbia, University in Bielefeld, Germany, as well as associations of these companies from these countries.

In sum, the LSEd Doctoral programme has already achieved considerable success and its members are developing a variety of directions to make it sustainable and ensure its growth both in quality and numbers as well as its international reputation and connectedness to be guaranteed. Thus, LSEd aims to seek further support and funding both externally and internally.

Publications

Members of the Linz School of Education have written 247 papers during the past 6 years and numerous other publications are in progress or under review. PhD students are highly active in writing publications as most dissertations are publication based and on average PhD students write 5-10 papers by their graduation. It is important to mention that the level of publications has been increasing during the past years and students often publish in high-end conferences and Scopus/Web of Science indexed Q1 and Q2 journals. We aim to include at least 3 Q1/Q2 journal publications in each dissertation together with supporting papers, but this is often exceeded by several students. In addition, current and graduated PhD students become members of editorial boards of journals and editors of journal special issues. We believe that our publications and high-quality work contribute to the scientific reputation of JKU. The number of published papers are increasing over the past years (Figure 5).
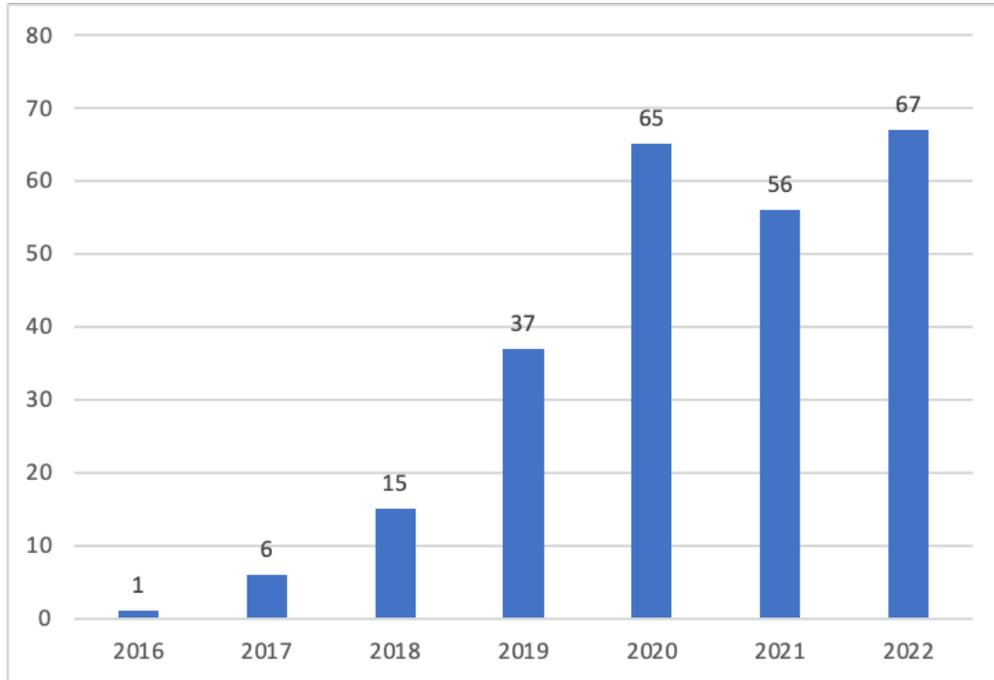
Figure 5: LSEd Publications by Year since 2016

In addition, publications are distributed in different scientific formats such as books, book chapters, conference proceedings and journal papers (Figure 6).
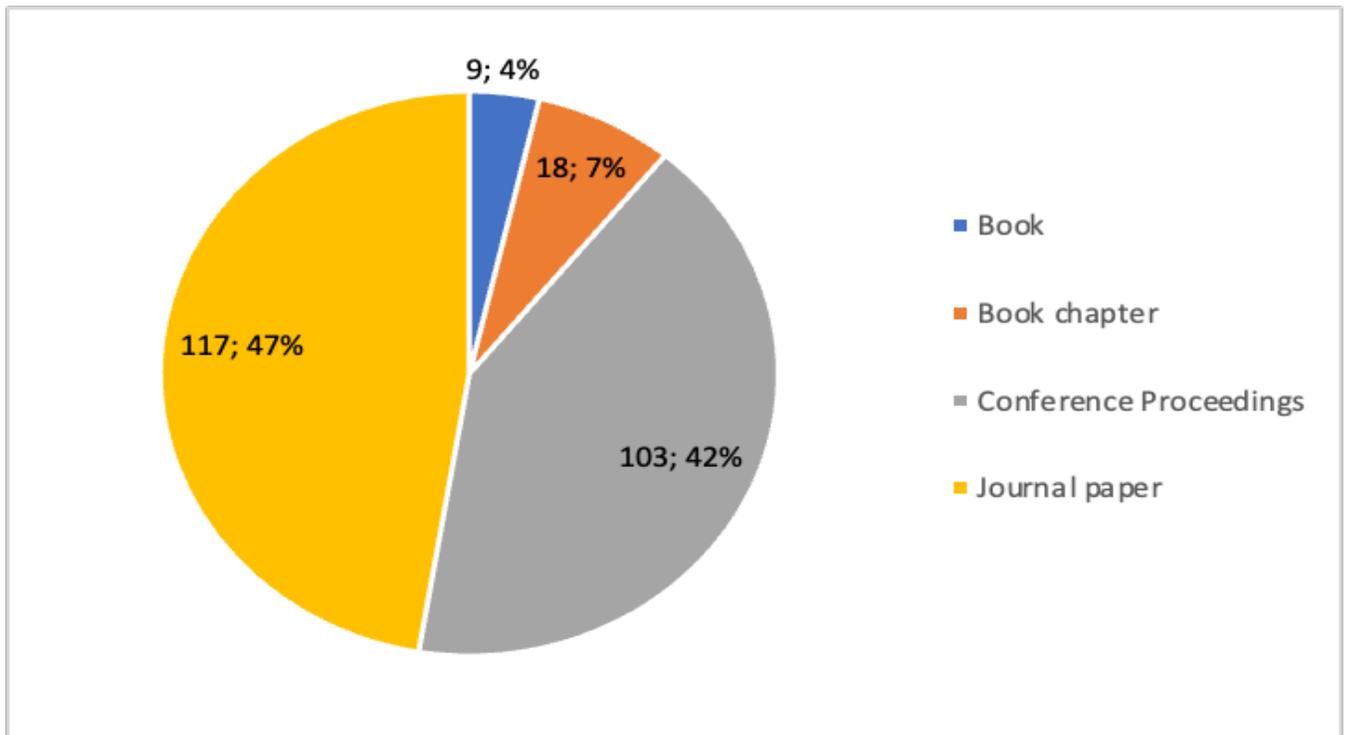

Figure 5: LSEd Publications by Type since 2016

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Bibliography

Abar, C., & Lavicza, Z. (2019). Underlying theories for use of digital technologies in mathematics education. *Acta Scientiae. Revista de Ensino de Ciências e Matemática*, *21*(1), 39–54.

Albaner, B. (2019). Neue Perspektiven der Lehramtsausbildung an der PH Kärnten durch neue Technologien und digitale Selbstwirksamkeitserwartung. *Forschungszeitung*.

Albaner, B., Kastner-Hauler, O., & Tengler, K. (2021). Near and far—Learning despite corona distance. *2020 Proceedings of the 1st International Conference 'From the 20th to the 21st Century in 15 Days: The Abrupt Transition of Our Educational Reality to Digital Environments'*, *1*, 113–120.

Albaner, B., Sabitzer, B., Demarle-Meusel, H., & Rottenhofer, M. (2020). Möglichkeiten und Herausforderungen des Educational Pyramid Scheme zur Implementierung digitaler Konzepte im Schulsystem. *Journal Für Schulentwicklung*, *4*(20), 21–26.

Albaner, B., Ulbing, N., & Harrich, P. (2020). Online Studieren an der PH Kärnten—Ergebnisse der E-Learning-Evaluation. *Forschungszeitung 2018-2019*, 67–71.

Altrichter, H., Herzog-Punzenberger, B., Fulterer, S., Brown, M., Burns, D., Nortvedt, G. A., Wiese, E., Nayir, F., Fellner, M., McNamara, G., & O'Hara, J. (2021). Leistungsbeurteilung und kulturelle Vielfalt: Herausforderungen und Bewertungspraktiken in Schulen der Sekundarstufe I in Österreich, Irland, Norwegen und der Türkei. *Erziehung & Unterricht*, *171*(3–4), 251–261.

Andjic, B., Bordás, A., Fenyvesi, K., Hoffmann, M., Szász Saxon, J., Téglási, I., Lavicza, Z., & al., et. (2022). *PUNTE - Poly-Universe in Teacher Training Education—Methodological Study Handbook for pre-service and in-service teachers and students*.

Andjić, B., Cvjetićanin, S., Lavicza, Z., Maričić, M., Novović, T., & Stešević, D. (2020). Mobile and printed dichotomous keys in constructivist learning of biology in primary school. *Research in Science & Technological Education*, *38*(3), 1470–1138.

Andjić, B., Lavicza, Z., Ulbrich, E., Cvjetićanin, S., Petrović, F., & Maričić, M. (2022). Contribution of 3D modelling and printing to learning in primary schools: A case study with visually impaired students from an inclusive Biology classroom. *Journal of Biological Education*, 1–17.

Andjić, B., Šorgo, A., Stešević, D., & Lavicza, Z. (2022). The factors which influence the continuance intention of teachers in using the interactive digital identification key for trees in elementary school science education. *Eurasia Journal of Mathematics, Science and Technology Education*, *18*(8), em2140.

Andjić, B., Ulbrich, E., Dana-Picard, T. N., Lavicza, & Zsolt. (2022). Usability of 3D modelling and printing in STEAM education: Primary school teachers perspective. *Twelfth Congress of the European Society for Research in Mathematics Education (CERME12)*.

Andre, M., & Lavicza, Z. (2019). Technology changing statistics education: Defining possibilities, opportunities and obligations. *The Electronic Journal of Mathematics and Technology*, *13*(3).

Andre, M., Lavicza, Z., & Prodromou, T. (2019). Formalizing students' informal statistical reasoning on real data: Using Gapminder to follow the cycle of inquiry and visual analyses. *Eleventh Congress of the European Society for Research in Mathematics Education (CERME11)*, *02*.

Aral, N., Baccaglini-Frank, A., Bach, C. C., Barbosa, A., Barlovits, S., Barthel, C., Baschek, E., Baumann-Wehner, M., Bikner-Ahsbahs, A., Borg, A., & others. (2020). Laura Abt 127, 231 Mette Andresen 419. *Mathematics Education in the Digital Age (MEDA)*, 499.

Bekesi, B., Houghton, T., & Lavicza, Z. (2022). Collaborative creative tasks with iPads. *Proceedings of the Third Mathematics Education in Digital Age (MEDA-3)*, 273–274.

Brandhofer, G., Buchner, J., Freisleben-Teutscher, C., & Tengler, K. (2020). *Tagungsband zur Tagung Inverted Classroom and beyond 2020*. Books on Demand GmbH.

Brown, M., Altrichter, H., Shiyan, I., Rodríguez Conde, M. J., McNamara, G., Herzog-Punzenberger, B., Vorobyeva, I., Vangrando, V., Gardezi, S., O'Hara, J., Postlbauer, A., Milyaeva, D., Sergeevna, N., Fulterer, S., García, A. G., & Sánchez, L. (2022). Challenges and opportunities for culturally responsive leadership in schools: Evidence from Four European countries. *Policy Futures in Education*, *20*(5), 580–607. https://doi.org/10.1177/14782103211040909

Budinski, N., Joksimović, J., Vučićević, D., & Lavicza, Z. (2021). Mathematical Dance Performance "A Point Has No Parts". *Proceedings of Bridges 2021: Mathematics, Art, Music, Architecture, Culture*, 343–346.

Budinski, N., & Lavicza, Z. (2019). Teaching Advanced Mathematical Concepts with Origami and GeoGebra Augmented Reality. *Bridges 2019 Conference Proceedings*, 386–390.

Budinski, N., & Lavicza, Z. (2020). Poetry in the Lesson of Mathematics. *Bridges 2020 Conference Proceedings*.

Budinski, N., & Lavicza, Z. (2022). A study of the application of mathematical modeling-based lessons in primary schools. *Didactica Matematicae*, *43*, 61–79.

Budinski, N., Lavicza, Z., & Fenyvesi, K. (2018). Ideas for using GeoGebra and Origami in Teaching Regular Polyhedrons Lessons. *K-12 STEM Education*, *4*(1), 297–303.

Budinski, N., Lavicza, Z., Fenyvesi, K., & Milinkovic, D. (2020). Developing Primary School Students' Formal Geometric Definitions Knowledge by Connecting Origami and Technology. *International Electronic Journal of Mathematics Education*, *15*(1).

Budinski, N., Lavicza, Z., Fenyvesi, K., & Novta, M. (2020). Mathematical and Coding Lessons Based on Creative Origami Activities. *Open Education Studies*, *1*(1), 220–227.

Budinski, N., Lavicza, Z., & Houghton, T. (2022). Opportunities for 3D printing in Hybrid Education. *Open Education Studies*, *4*(1), 339–344.

Budinski, N., Lavicza, Z., Vukić, N., Teofilović, V., Kojić, D., Erceg, T., & Budinski-Simendić, J. (2019). Interconnection of Materials Science, 3D Printing, Mathematics in Interdisciplinary Education. *Journal of Social and Technological Development*, *2*, 21–30.

Burgsteiner, H., & Krammer, G. (Eds.). (2022). *Impacts of COVID-19 Pandemic's Distance Learning on Students and Teachers in Schools and in Higher Education – International Perspectives*. Leykam. https://doi.org/10.56560/isbn.978-3-7011-0496-3

Burnard, P., Lavicza, Z., Philbin, C. A., & others. (2016). Strictly Coding: Connecting Mathematics and Music through Digital Making. *Proceedings of Bridges 2016: Mathematics, Music, Art, Architecture, Education, Culture*, 345–350.

Burnard, P., Sinha, P., Steyn, C., Fenyvesi, K., Brownell, C., Werner, O., & Lavicza, Z. (2019). Reconfiguring STEAM through Material Enactments of Mathematics and Arts: A Diffractive Reading of Young People's Intradisciplinary Math-Artworks. In *Why Science and Art Creativities Matter* (pp. 171–199). Brill Sense.

Capozuccaa, A., Fenyvesi, K., Stettner, E., Miyazaki, K., Maehata, N., Brownell, C., Kaukolinna, M., Pekonen, O., & Lavicza, Z. (2020). Exploring spherical symmetries through hands-on and digital modeling: Temari in the classroom! *International Conference on the Advancement of STEAM - ICAS*.

Dana-Picard, T., Hershkovitz, S., Lavicza, Z., & Fenyvesi, K. (2021). Introducing Golden Section in the Mathematics Class to Develop Critical Thinking from the STEAM Perspective. *Southeast Asian Journal of STEM Education*, *2*(1), 151–169.

Demarle-Meusel, H., Rottenhofer, M., Albaner, B., & Sabitzer, B. (2020). Educational Pyramid Scheme–A Sustainable Way Of Bringing Innovations To School. *2020 IEEE Frontiers in Education Conference (FIE)*, 1–7. https://doi.org/10.1109/FIE44824.2020.9274172

Diego-Mantecón, J. M., Arcera, Ó., Blanco, T. F., & Lavicza, Z. (2019). An Engineering Technology Problem-Solving Approach for Modifying Student Mathematics-Related Beliefs: Building a Robot to Solve a Rubik's Cube. *International Journal for Technology in Mathematics Education*, *26*(2), 55–64.

Diego-Mantecón, J.-M., Blanco, T.-F., Ortiz-Laso, Z., & Lavicza, Z. (2020a). Proyectos STEAM con formato KIKS para el desarrollo de competencias clave. *Comunicar: Revista Científica de Comunicación y Educación*, *29*(66).

Diego-Mantecón, J.-M., Blanco, T.-F., Ortiz-Laso, Z., & Lavicza, Z. (2020b). STEAM projects with KIKS format for developing key competences. *Comunicar*.

Diego-Mantecon, J.-M., Prodromou, T., Lavicza, Z., Blanco, T. F., & Ortiz-Laso, Z. (2021). An attempt to evaluate STEAM project-based instruction from a school mathematics perspective. *ZDM–Mathematics Education*, *53*(5), 1137–1148.

Dimmel, N., & Schweiger, G. (Eds.). (2023). *Kinder und Jugendliche in pandemischer Gesellschaft*. Springer.

Donevska-Todorova, A., Faggiano, E., Trgalova, J., Lavicza, Z., Weinhandl, R., Clark-Wilson, A., & Weigand, H.-G. (2020). *Proceedings of the European Society for Mathematics Education 10th Topic Conference: Mathematics Education in the Digital Age*.

Dos Santos, J. M., Silveira, A., & Lavicza, Z. (2022). Support mathematics teachers' technology training in Portuguese-speaking African countries (PALOP). *45th Conference of the International Group for the Psychology of Mathematics Education - PME*.

Dos Santos, J., Silveira, A., & Lavicza, Z. (2022). Abordagem STEAM e GeoGebra—Aprendizagem e Ensino das Ciências na formação de professores de Cabo Verde. *Revista Sensos-e*, *9*, 58–71.

El Bedewy, S., Choi, K., Lavicza, Z., Fenyvesi, K., & Houghton, T. (2021). STEAM Practices to Explore Ancient Architectures Using Augmented Reality and 3D Printing with GeoGebra. *Open Education Studies*, *3*(1), 176–187.

El Bedewy, S., Lavicza, Z., Haas, B., & Lieban, D. (2022). A STEAM Practice Approach to Integrate Architecture, Culture and History to Facilitate Mathematical Problem-Solving. *Education Sciences*, *12*(1), 9.

ELBedewy, S., & Lavicza, Z. (2020). A conceptual approach on mingling Augmented Reality, 3D printing and ancient architectural modelling using GeoGebra. *Mathematics Education in the Digital Age (MEDA)*, 349.

Fenyvesi, K., Brownell, C., Burnard, P., Sinha, P., Olivier, W., Steyn, C., & Lavicza, Z. (2019). Mathematics and Art Connections Expressed in Artworks by South African Students. In *On Art and Science* (pp. 291–312). Springer.

Fenyvesi, K., Brownell, C., Burnard, P., Steyn, C., Olivier, W., Sinha, P., Lavicza, Z., Lehto, S., Peltonen, K., & others. (2020). Organizing Children and Youth Mathematical Art Exhibits and Interpreting MathArt-works through a Collaborative, Transdisciplinary Practice. *Bridges 2020 Conference Proceedings*, 539–546.

Fenyvesi, K., Brownell, C. S., Salmi, H., Park, H. G., Muntean, A., Kaukolinna, M., Thuneberg, H., Bogner, F., & Lavicza, Z. (2019). Environmental Problem-solving and Hands-on Geometry Learning through Storytelling inside a Geodesic Dome: Ice, Honey and Stardust. *Bridges 2019 Conference Proceedings*, 635–642.

Fenyvesi, K., Brownell, C. S., Sinnemäki, J., & Lavicza, Z. (2021). Activating creativities by emphasising health and wellbeing: A holistic pedagogical practice from Finland. In *Sculpting New Creativities in Primary Education, Taylor & Francis* (pp. 123–145). Routledge.

Fenyvesi, K., Budinski, N., Kaukolinna, M., Lakos, D., & Lavicza, Z. (2020). Playful Development of Mathematical Thinking Skills in Primary and Secondary School with the Logifaces STEAM Education Toolkit. *LUMAT Research Symposium*, 40.

Fenyvesi, K., Houghton, T., Diego-Mantecón, J. M., Crilly, E., Oldknow, A., Lavicza, Z., & Blanco, T. F. (2017). Kids Inspire Kids for STEAM. *STEAM Journal*, *3*.

Fenyvesi, K., Lehto, S., Brownell, C., Nasiakou, L., Lavicza, Z., & Kosola, R. (2019). Learning Mathematical Concepts as a Whole-Body Experience: Connecting Multiple Intelligences, Creativities and Embodiments within the STEAM Framework. In *Why Science and Art Creativities Matter* (pp. 300–336). Brill Sense.

Fenyvesi, K., Park, H.-G., Song, K.-C., Lavicza, Z., & Back, M. (2018). Renewable Energy Resources for Mathematics Learning: Windmills and Water Wheels at the Math Class. *Bridges Conference Proceedings*.

Fenyvesi, K., Vecsei, Á., Lieban, D., Lavicza, Z., Park, H., & Vecsei, G. (2017). Omnidirectional Robot Construction at the Math Class. *Bridges Conference Proceedings;*

Fickermann, D., Edelstein, B., Gerick, J., & Racherbäumer, K. (Eds.). (2021). *Schule und Schulpolitik während der Corona-Pandemie: Nichts gelernt?* Waxmann Verlag GmbH. https://doi.org/10.31244/9783830994589

Gamsjäger, M., Himmelsbach, M., & Lenz, S. (2022). Lerngelegenheiten in der Schulpraxis: Evaluation der Pädagogisch Praktischen Studien am Standort Linz, Cluster Mitte. In G. Schauer, L. Jesacher-Rößler, D. Kemethofer, J. Reitinger, & C. Weber (Eds.), *Einstiege, Umstiege, Aufstiege* (pp. 179–197). Waxmann.

Groher, I., Sabitzer, B., Demarle-Meusel, H., Kuka, L., & Hofer, A. (2021). Work-in-Progress: Closing the Gaps: Diversity in Programming Education. *2021 IEEE Global Engineering Education Conference (EDUCON)*, 1449–1453.

Groher, I., Vierhauser, M., Sabitzer, B., Kuka, L., Hofer, A., & Muster, D. (2022). Exploring diversity in introductory programming classes: An experience report. *44th International Conference on Software Engineering: Software Engineering Education and Training*.

Haas, B., Kreis, Y., & Lavicza, Z. (2020a). Connecting the real world to mathematical models in elementary schools in Luxemburg. *Proceedings of the British Society for Research into Learning Mathematics (BSRLM) Conference*, *40*(2).

Haas, B., Kreis, Y., & Lavicza, Z. (2020b). Fostering process skills with the educational technology software MathemaTIC in elementary schools. *Mathematics Education in the Digital Age (MEDA)*, 199.

Haas, B., Kreis, Y., & Lavicza, Z. (2020c). Outdoor STEAM integrated framework in elementary schools in Luxembourg using MathCityMap and GeoGebra 3D Calculator. *25th Asian Technology Conference in Mathematics (ATCM)*.

Haas, B., Kreis, Y., & Lavicza, Z. (2021a). Case Study on Augmented Reality, Digital and Physical Modelling with Mathematical Learning Disabilities Students in an Elementary School in Luxembourg. *International Journal for Technology in Mathematics Education*, *28*(3), 125–132.

Haas, B., Kreis, Y., & Lavicza, Z. (2021b). Integrated STEAM Approach in Outdoor Trails with Elementary School Pre-service Teachers. *Journal of Educational Technology & Society*, *24*(4).

Haas, B., Kreis, Y., & Lavicza, Z. (2021c). Integrated STEAM Approach in Outdoor Trails with Elementary School Pre-service Teachers in Luxemburg. *Journal of Educational Technology & Society*, *24*(4), 205–219.

Haas, B., Kreis, Y., & Lavicza, Z. (2021d). *Mixed-methods research in STEAM outdoor trails in elementary school pre-service teacher training*.

Haas, B., Kreis, Y., & Lavicza, Z. (2021e). Parent's Perspectives: The Use of Augmented Reality, Digital and Physical Mathematical Modelling in Remote Teaching in Elementary School. *EIDESSTATTLICHE ERKLÄRUNG*.

Haas, B., Kreis, Y., & Lavicza, Z. (2021f). *The STEAM skilled child: How children can learn to apply STEAM skills to their living environment*.

Haas, B., Kreis, Y., Lavicza, Z., Houghton, T., & Fenyvesi, K. (2022). STEAM-based learning ecosystems involving Digital Toolkits, Tutoring Systems, 3D Printing and Mathematical Trails. *Twelfth Congress of the European Society for Research in Mathematics Education*.

Haas, B., Lavicza, Z., Dana-Picard, N., & Kreis, Y. (2020). *Transition from in-class to outdoor learning with real-world mathematical modelling: PhD research project 2015-2021*.

Haas, B., Lavicza, Z., Houghton, T., & Kreis, Y. (2022). Evaluating technology-enhanced, STEAM-based remote teaching with parental support in Luxembourgish early childhood education. *Frontiers in Education*, *7*, 319.

Haas, B., Lavicza, Z., & Kreis, Y. (2020a). *STEAM Education in elementary schools: A holistic investigation on technology enhanced teaching and learning*.

Haas, B., Lavicza, Z., & Kreis, Y. (2020b). STEAM in special needs education in an elementary school in Luxemburg. *INSTEAD VI - Workshop on Innovative Teaching Methodologies for Math Courses on Engineering Degrees*.

Hass, B., Lavicza, Z., & Kreis, Y. (2023). Parent's experience in remote learning during COVID-19 with digital and physical mathematical modelling. *Research and Practice in Technology Enhanced Learning*, *18*, 1–21.

Helm, C., Huber, S. G., & Postlbauer, A. (2021). Lerneinbußen und Bildungsbenachteiligung durch Schulschließungen während der Covid-19-Pandemie im Frühjahr 2020. Eine Übersicht zur aktuellen Befundlage. In D. Fickermann, B. Edelstein, J. Gerick, & K. Racherbäumer (Eds.), *Schule und Schulpolitik während der Corona-Pandemie: Nichts gelernt?* (pp. 59–81). Waxmann Verlag GmbH. https://doi.org/10.31244/9783830994589.03

Helm, C., & Lenz, S. (2021). *JKU-Bildungsbarometer #3. Schulen im Lockdown: Bericht zu direkten und indirekten Auswirkungen von offenem Unterricht während der Pandemie*. Johannes Kepler University Linz, School of Education. https://doi.org/10.35011/jbb.2021-3

Helm, C., Lenz, S., & Postlbauer, A. (2022). Mit Schul- und Unterrichtsentwicklung der Krise trotzen. *Journal Für Schulentwicklung*, *26*(2), 18–26.

Helm, C., & Postlbauer, A. (2021a). *JKU-Bildungsbarometer #1. Schulen im 3. Lockdown: 1. Bericht zur repräsentativen Elternumfrage in Österreich*. Johannes Kepler University Linz. https://doi.org/10.35011/jbb.2021-1

Helm, C., & Postlbauer, A. (2021b). Schulschließungen in Österreich – Ein Fazit nach einem Jahr Pandemie. *Psychologie in Erziehung Und Unterricht*, *68*(4), 306–311. https://doi.org/10.2378/peu2021.art27d

Helm, C., & Postlbauer, A. (2023). Fernunterricht / Distance Learning. In M. Huber & M. Döll (Eds.), *Bildungswissenschaft in Begriffen, Theorien und Diskursen*. Springer.

Himmelsbach, M., Lenz, S., Wimmer, B., & Gamsjäger, M. (2020). Mentor*innen als Lehrerbildner*innen. *Schulheft*, *45*(4), 95–105.

Hinterplattner, S., Rottenhofer, M., Groher, I., & Sabitzer, B. (2022). Exploring Students' Experiences and Perceptions of Computer Science: A Survey of Austrian Secondary Schools. *Proceedings of the 14th International Conference on Computer Supported Education -Volume 2*, 238–247. https://www.scitepress.org/PublicationsDetail.aspx?ID=BK0rmPfoK0w=&t=1

Hinterplattner, S., & Sabitzer, B. (2018). Interdisciplinary problem-based learning with gifted students. *EDULEARN18 Proceedings*, 8845–8849.

Hinterplattner, S., & Sabitzer, B. (2021). Chapter Seven Potentials and Challenges. *Honors Education around the World*, 112.

Hinterplattner, S., Sabitzer, B., Demarle-Meusel, H., & Mössenböck, H. (2019). Promoting Talents for Computer Science. *CSEDU (1)*, 557–564.

Hinterplattner, S., Sabitzer, B., Skogø, J., & others. (2019). The children's congress at the JKU Linz: Young researchers and interdisciplinary projects. *Proceedings of Bridges*, 529–532.

Hinterplattner, S., Sabitzer, B., & Skogø, J. S. (2019). Interdisciplinary Projects to promote Gifted Primary Students and Their Digital Compencies. *ICERI2019 Proceedings*, 8964–8967.

Hinterplattner, S., Sabitzer, B., & Skogø, J. S. (2020). Working on Interdisciplinary Projects to Strengthen Creative Computational Thinking and to Support Talent Development. *International Conference on Computer Supported Education*, 317–340.

Hinterplattner, S., Skogø, J. S., Kröhn, C., & Sabitzer, B. (2020). The Children's Congress: A Benefit to All Levels of Schooling by Strengthening Computational Thinking. *International Journal of Learning and Teaching*, *6*(4), 241–246.

Hinterplattner, S., Skogø, J., & Sabitzer, B. (2019). Beyond the Game: Exploring Winning Strategies With Gifted Students. *ECGBL 2019 13th European Conference on Game-Based Learning*, 325.

Hinterplattner, S., Wolfensberger, C., M, V., & Lavicza, Z. (2020). Wenn begabte Schüler*innen warten Erfahrungen begabter Schüler*innen im Regelunterricht. In *Promotion of talent, performance development, educational equity—For everyone!* (Vol. 9, pp. 429–440). Waxmann Verlag GmbH.

Hinterplattner, S., Wolfensberger, M., & Lavicza, Z. (2022). Honors Students' Experiences and Coping Strategies for Waiting Time in Secondary School and at University. *Journal for the Education of the Gifted*, *45*(1), 84–107.

Hofstätter, B., Kröhn, C., Sabitzer, B., & Thaler, A. (2019). KIDS4WEARABLES: Sustainability, Usability and Creativity in STEM Education. *ICERI2019 Proceedings*, 8958–8963. https://library.iated.org/view/HOFSTATTER2019KID

Hohenwarter, M., Hohenwarter, J., Kreis, Y., & Lavicza, Z. (2017). DETERMINACIÓN DEL DOMINIO Y RANGO DE UNA RELACIÓN CON LA AYUDA DEL PROCESADOR GEOMÉTRICO GEOGEBRA. *FORMACIÓN Y MODELACIÓN EN CIENCIAS BÁSICAS*, 36.

Hörmann, C., Hinterplattner, S., & Sabitzer, B. (2021). SARS-COVID-19–Eine Chance für die Bildungslandschaft? Untersuchung zur Umsetzung der Digitalen Grundbildung während des Lockdowns. *Medienimpulse*, *59*(3), 33-Seiten.

Hörmann, C., Kuka, L., & Sabitzer, B. (2021). Digital Literacy in Austrian Lower Secondary Education—A Synthesis and Evaluation of Experiences in the First Two Years. *2021 6th International STEM Education Conference (ISTEM-Ed)*, 1–4. http://dx.doi.org/10.1109/iSTEM-Ed52129.2021.9625126

Hörmann, C., Rottenhofer, M., Groher, I., & Sabitzer, B. (2021). Let the Games Begin—Inviting Young Learners to Code. *Proceedings of the 26th ACM Conference on Innovation and Technology in Computer Science Education V. 2*, 644. Let the Games Begin - Inviting Young Learners to Code

Hörmann, C., & Sabitzer, B. (2020). Digital Literacy in Lower Secondary Education—A First Evaluation of the Situation in Austria. *ISSEP (CEURWS Volume)*, 140–151. http://ceur-ws.org/Vol-2755/paper12.pdf

Hörmann, C., Schmidthaler, E., Kuka, L., Rottenhofer, M., & Sabitzer, B. (2022). From Non-Existent to Mandatory in Five Years – The Journey of Digital Education in the Austrian School System. *Proceedings of ISSEP*. https://www.researchgate.net/publication/363892012_From_Non-Existent_to_Mandatory_in_Five_Years_-_The_Journey_of_Digital_Education_in_the_Austrian_School_System

Houghton, A., Oldknow, A., Diego-Mantecón, J. M., Fenyvesi, K., Crilly, E., & Lavicza, Z. (2020). KIKS Creativity and Technology for All. *Open Education Studies*, *1*(1), 198–208.

Houghton, T., Lavicza, Z., Diego-Mantecón, J.-M., Fenyvesi, K., Weinhandl, R., & Rahmadi, I. F. (2022). Hothousing: Utilising industry collaborative problem solving practices for STEAM in schools. *Journal of Technology and Science Education*, *12*(1), 274–289.

Houghton, T., Lavicza, Z., Rahmadi, I. F., Diego-Mantecon, J.-M., Fenyvesi, K., Weinhandl, R., & Ortiz-Laso, Z. (2022). STEAMTEACH Austria: Towards a STEAM Professional Development Program. *International Journal of Research in Education and Science*, *8*(3), 502–512.

Hreinsdóttir, F., Lavicza, Z., & others. (2019). Silent video tasks: Towards a definition. *Eleventh Congress of the European Society for Research in Mathematics Education*, *11*.

Huber, M., & Döll, M. (Eds.). (2023). *Bildungswissenschaft in Begriffen, Theorien und Diskursen*. Springer.

Infanger, E.-M., Infanger, G., Lavicza, Z., & Sobieczky, F. (2022). Applying Time-Inhomogeneous Markov Chains to Math Performance Rating. *International Conference on Database and Expert Systems Applications*, 11–21.

Kasti, H., & Lavicza, Z. (2021). The effect of iterations, collaboration, and designing GeoGebra modules on in-service secondary mathematics teachers. *Turkish Journal of Computer and Mathematics Education (TURCOMAT)*, *12*(14), 1590–1599.

Kasti, H., & Lavicza, Z. (2022). Developing an innovation pyramid framework to reflect on the digitalisation of mathematics education. *Proceedings of the Third Mathematics Education in Digital Age (MEDA-3)*, 101–108.

Kastner-Hauler, O., Sabitzer, B., & Tengler, K. (2020). BBC micro:Bit Experiments – Spicing up Computational Thinking Skills. *14th International Technology, Education and Development Conference*. https://library.iated.org/view/KASTNERHAULER2020BBC

Kastner-Hauler, O., Tengler, K., Demarle-Meusel, H., & Sabitzer, B. (2021). Adapting an OER Textbook for the Inverted Classroom Model—How To Flip the Classroom with BBC micro: Bit Example Tasks. *2021 IEEE Frontiers in Education Conference (FIE)*, 1–8.

Kastner-Hauler, O., Tengler, K., Sabitzer, B., & Lavicza, Z. (2022a). Combined Effects of Block-Based Programming and Physical Computing on Primary Students' Computational Thinking Skills. *Frontiers in Psychology*, 2463.

Kastner-Hauler, O., Tengler, K., Sabitzer, B., & Lavicza, Z. (2022b). Combined effects of block-based programming and physical computing on primary students' computational thinking skills. *Frontiers in Psychology*, *13*.

Keller, S., Krafft, M., Fraser, G., Walkinshaw, N., Otto, K., & Sabitzer, B. (2019). Improving Scratch Programming with CRC-Card Design. *Proceedings of the 14th Workshop in Primary and Secondary Computing Education*, 1–4. https://dl.acm.org/doi/abs/10.1145/3361721.3362114

Körber, N., Bailey, L., Greifenstein, L., Fraser, G., Sabitzer, B., & Rottenhofer, M. (2021). An Experience of Introducing Primary School Children to Programming using Ozobots (Practical Report). *The 16th Workshop in Primary and Secondary Computing Education*, 1–6. https://doi.org/10.1145/3481312.3481347

Korenova, L., Kis, M., Lavicza, Z., Ostradicky, P., & Prodromou, T. (2018). New Directions in Nationwide Technology Integration into Mathematics Teaching: The Geomatech Project. *DIVAI 2018*, 81–90.

Korenova, L., Kožuchová, M., Dostál, J., & Lavicza, Z. (2019). Applications of Augmented Reality Apps in Teaching Technical Skills Courses. In *Augmented Reality in Educational Settings* (pp. 383–409). Brill Sense.

Korenova, L., Lavicza, Z., & Veress-Bágyi, I. (2019). Augmented Reality Applications in Early Childhood Education. In *Augmented Reality in Educational Settings* (pp. 101–119). Brill Sense.

Korenova, L., Rahmadi, I. F., & Lavicza, Z. (2020). Students' Utilisation of Mobile Devices with Regards to Learning Mathematics Comparing Central Europe and Indonesia. *Distance Learning in Applied Informatics - DIVAi*.

Kreis, Y., Haas, B., & Lavicza, Z. (2021a). *3D Modelling in online learning for pre-service elementary school teachers at the University of Luxembourg*.

Kreis, Y., Haas, B., & Lavicza, Z. (2021b). eJMT Problem Corner: June 2021. *The Electronic Journal of Mathematics & Technology*.

Kreis, Y., Haas, B., & Lavicza, Z. (2021c). *First results of the iterative STEAM design process in 3D modelling and printing with pre-service teachers*.

Kristinsdóttir, B. B., Hreinsdóttir, F., & Lavicza, Z. (2019a). Silent video tasks: Towards a definition. *In M. van Den Heuvel-Panhuizen, M. Veldhuis, & U.T. Jankvist (Eds.) Proceedings of the Eleventh Congress of the European Society for Research in Mathematics Education*.

Kristinsdóttir, B. B., Hreinsdóttir, F., & Lavicza, Z. (2019b). Using Silent Video Tasks for Formative Assessment. *ICTMT Conference Proceedings*.

Kristinsdóttir, B. B., Hreinsdóttir, F., & Lavicza, Z. (2020a). Designing online formative assessment that promotes students' reasoning processes. *Proceedings of the 14th International Conference on Technology in Mathematics Teaching - ICTMT 14, Essen, Germany*, *1*, 189–196.

Kristinsdóttir, B. B., Hreinsdóttir, F., & Lavicza, Z. (2020b). Silent video tasks and the importance of teacher collaboration for task development. *Mathematics Education in the Digital Age (MEDA)*, 415.

Kristinsdóttir, B., Hreinsdóttir, F., & Lavicza, Z. (2018). Initiating student discourses with silent video tasks in mathematics classrooms. *Proceedings of the 42nd Conference of the International Group for the Psychology of Mathematics Education*, *5*(92).

Kristinsdóttir, B., Hreinsdóttir, F., & Lavicza, Z. (2021a). Developing Silent Video Tasks' Instructional Sequence in Collaboration with Teachers. *The 15th International Conference on Technology in Mathematics Teaching – ICTMT 15*, 156–163.

Kristinsdóttir, B., Hreinsdóttir, F., & Lavicza, Z. (2021b). Some lessons regarding inclusion and teacher change learnt from developing silent video tasks. *Proceedings of the 44th Conference of the International Group for Psychology of Mathematics Education (PME)*, *1*, 158–159.

Kristinsdóttir, B., Hreinsdóttir, F., & Lavicza, Z. (2022). Development of silent video tasks as a tool for formative assessment. *Twelfth Congress of the European Society for Research in Mathematics Education (CERME12)*.

Kristinsdóttir, B., Hreinsdóttir, F., Lavicza, Z., & others. (2018). *Realizing students' ability to use technology with silent video tasks*.

Kristinsdóttir, B., Hreinsdóttir, F., Lavicza, Z., & Wolff, C. E. (2020). Teachers' noticing and interpretations of students' responses to silent video tasks. *Research in Mathematics Education*, *22*(2), 135–153.

Kröhn, C., Groher, I., Sabitzer, B., & Kuka, L. (2020). Female Computer Scientists Needed: Approaches For Closing The Gender Gap. *2020 IEEE Frontiers in Education Conference (FIE)*, 1–4. https://ieeexplore.ieee.org/document/9273933

Krohn, C., Groher, I., Sabitzer, B., & Kuka, L. (2020). Female Computer Scientists Needed: Approaches for Closing the Gender Gap. *Proceedings - Frontiers in Education Conference, FIE*, *2020-October*. https://doi.org/10.1109/FIE44824.2020.9273933

Kröhn, C., Hinterplattner, S., & Sabitzer, B. (2020). Towards an Implementation of a Peer-Learning and Peer-Teaching Group in Programming. *Proceedings of the 2020 ACM Conference on Innovation and Technology in Computer Science Education*, 559. https://dl.acm.org/doi/10.1145/3341525.3393971

Kröhn, C., & Sabitzer, B. (2020). Peer-Learning and Talents Exchange in Programming: Experiences and Challenges. *CSEDU*, 466–471. https://www.scitepress.org/Link.aspx?doi=10.5220/0009472004660471

Lavicza, Z. (2020). STEAM education approaches and technological innovations to foster creativities in schools in a digital era. *Proceedings of the First Symposium on Artificial Intelligence for Mathematics Education*.

Lavicza, Z., Fenyvesi, K., Lieban, D., Hohenwarter, M., Mantecon, J. D., & Prodromou, T. (2018). Mathematics Learning through Arts, Technology and Robotics: Multi- and Transdisciplinary STEAM Approaches. *8th ICMI-East Asia Regional Conference on Mathematics Education*.

Lavicza, Z., Haas, B., & Kreis, Y. (2020). Discovering Everyday Mathematical Situations Outside the Classroom with MathCityMap and GeoGebra 3D. *Research on Outdoor STEM Education in the DigiTal Age: Proceedings of the ROSETA Online Conference in June 2020*, 23–30.

Lavicza, Z., Prodromou, T., Fenyvesi, K., Hohenwarter, M., Juhos, I., & Koren, B. (2020). Integrating STEM-related Technologies into Mathematics Education at a Large Scale. *International Journal for Technology in Mathematics Education*, *27*(1), 3–12.

Lavicza, Z., Weinhandl, R., Prodromou, T., An\djić, B., Lieban, D., Hohenwarter, M., Fenyvesi, K., Brownell, C., & Diego-Mantecón, J. M. (2022). Developing and Evaluating Educational Innovations for STEAM Education in Rapidly Changing Digital Technology Environments. *Sustainability*, *14*(12), 7237.

Leoste, J., Lavicza, Z., Tuul, M., Fenyvesi, K., & Õun, T. (2022). Enhancing Digital Skills of Early Childhood Teachers through online STEAM training programs in Estonia. *Frontiers in Education*, 284.

Lieban, D., Barreto, M. M., Reichenberger, S., Lavicza, Z., & Schneider, R. M. (2018). Developing Mathematical and Technological Competencies of Students Through Remodeling Games and Puzzles. *Bridges 2018 Conference Proceedings*.

Lieban, D., Kristinsdóttir, B. B., & Lavicza, Z. (2019). Setting a Creative Math Task with SET 3D: Modeling Physical Pieces through Digital Resources. *Bridges 2019 Conference Proceedings*, 489–492.

Lieban, D., & Lavicza, Z. (2017). *Geometric Modeling as Spatial Thinking Approach among Prospective Teachers*.

Lieban, D., & Lavicza, Z. (2018a). Geometric modelling inspired by Da Vinci: Shaping and adding movement using technology and physical resources. *CERME 10 Conference*.

Lieban, D., & Lavicza, Z. (2018b). Historical Examples of Da Vinci Mechanisms triggering New Approaches in Teaching Mathematics with Technology. *Proceedings of the Conference on History of Mathematics and Teaching of Mathematics*.

Lieban, D., & Lavicza, Z. (2019a). Dissecting a cube as a teaching strategy for enhancing students' spatial reasoning: Combining physical and digital resources. *Proceedings of Bridges 2019: Mathematics, Art, Music, Architecture, Education, Culture*, 319–326.

Lieban, D., & Lavicza, Z. (2019b). Instrumental genesis and heuristic strategies as frameworks to geometric modeling in connecting physical and digital environments. *Eleventh Congress of the European Society for Research in Mathematics Education*, *19*.

Lieban, D., Ulbrich, E., Barreto, M., & Lavicza, Z. (2019a). A new era of manipulatives: Making your own resources with 3D printing and other technologies. *Eleventh Congress of the European Society for Research in Mathematics Education*, *12*.

Lieban, D., Ulbrich, E., Barreto, M., M., & Lavicza, Z. (2019b). A new era of manipulatives: Making your own resources with 3D printing and other technologies. *Bridges 2019 Conference Proceedings*.

Lindenbauer, E., & Lavicza, Z. (2017). *Using dynamic worksheets to support functional thinking in lower secondary school*.

Lindenbauer, E., & Lavicza, Z. (2021). From Research to Practice: Diagnosing and Evaluating Students' Conceptions in a Formative Assessment Tool Utilising Digital Worksheets in Functional Thinking. *International Journal for Technology in Mathematics Education*, *28*(3), 133–142.

Lindenbauer, E., Lavicza, Z., & Weinhandl, R. (2022). Initiating the development of a pre-service teacher training course based on research on students' digital resource and teaching designs. *Twelfth Congress of the European Society for Research in Mathematics Education (CERME12)*.

Mantecón, J. M. D., Blanco, T. F., Laso, Z. O., & Lavicza, Z. (2021). Proyectos STEAM con formato KIKS para el desarrollo de competencias clave. *Comunicar: Revista Científica Iberoamericana de Comunicación y Educación*, *66*, 33–43.

Mayerhofer, M., Eichmair, M., Hohenwarter, M., Lavicza, Z., & Weinhandl, R. (2022). Developing personas to support professional practices of mathematics teacher educators. *Twelfth Congress of the European Society for Research in Mathematics Education (CERME12)*.

Meseldžija, M., Vukić, N., Erceg, T., Budinski, N., Lavicza, Z., Lera, I., & Kojić, D. (2019). The analysis of the substrate influence on the print quality parameters of screen-printed textile. *8th International Conference of Social and Technological Development*.

Nam, P. S., Tuong, H. A., Weinhandl, R., & Lavicza, Z. (2022). Mathematics Teachers' Professional Competence Component Model and Practices in Teaching the Linear Functional Concept—An Experimental Study. *Mathematics*, *10*(21), 4007.

Nothacker, J., & Lavicza, Z. (2020). Digital Didactic Objectives of Primary, Secondary, and Higher Education Curricula in the 21st Century Executable with a Single-board Computer. *Open Education Studies*, *2*(1), 344–359.

Obermeier, R., Lenz, S., & Helm, C. (2022a). The Effect of Open Learning Environments in Designing and Implementing Successful Distance Learning Programmes During School Closures. In H. Burgsteiner & G. Krammer (Eds.), *Impacts of COVID-19 Pandemic's Distance Learning on Students and Teachers in Schools and in Higher Education – International Perspectives* (pp. 274–306). Leykam. https://doi.org/10.56560/isbn.978-3-7011-0496-3_14

Obermeier, R., Lenz, S., & Helm, C. (2022b). Zusammenhänge zwischen sozialer Herkunft, Unterrichtsform und Learning Outcomes während der Pandemie. *Zeitschrift Für Bildungsforschung*, *12*(2), 331–352. https://doi.org/10.1007/s35834-022-00355-5

Otto, K., Kröhn, C., & Sabitzer, B. (2020). Immersion into the World of Gaming: An Approach of Introducing Gamification in an Educational Context. *CSEDU*, 245–252.

Postlbauer, A., & Helm, C. (2021). *1 Jahr Fernunterricht! Erkenntnisse zur Entwicklung der Lage aus Sicht der Eltern*.

Postlbauer, A., Helm, C., & Große, C. S. (2022). Educational inequality and COVID-19: Who takes advantage of summer schools and other remedial measures? *Zeitschrift Für Bildungsforschung, 12*(2), 407–436. https://doi.org/10.1007/s35834-022-00356-4

Postlbauer, A., Helm, C., Huber, S. G., & Große, C. S. (2023). How did Educational Inequality Emerge During the Pandemic? An Analysis of Differential Effects of Students' Socioeconomic Background on Changes in Curricular and Leisure Activities During COVID-19-Related School Closures. In N. Dimmel & G. Schweiger (Eds.), *Kinder und Jugendliche in pandemischer Gesellschaft*. Springer. https://doi.org/10.1007/978-3-658-39304-5

Prodromou, T., & Lavicza, Z. (2017). Integrating technology into mathematics education in an entire educational system—Reaching a critical mass of teachers and schools. *International Journal for Technology in Mathematics Education*, *24*(3), 129–135.

Prodromou, T., & Lavicza, Z. (2018). Inquiry-Based Learning in Statistics: When Students Engage with Challenging Problems in STEM Disciplines. In *STEM Education An Emerging Field of Inquiry* (Vol. 1, pp. 117–131). Brill.

Rahmadi, I. F., & Lavicza, Z. (2021). Pedagogical innovations in elementary mathematics instructions: Future learning and research directions. *International Journal on Social and Education Sciences*, *3*(2), 360–378.

Rahmadi, I. F., Lavicza, Z., Arkün Kocadere, S., Houghton, T., & Hohenwarter, M. (2022). The strengths and weaknesses of user-generated microgames for assisting learning. *Education and Information Technologies*, *27*(1), 979–995.

Rahmadi, I. F., Lavicza, Z., & Houghton, T. (2021). Towards User-generated Microgames for Supporting Learning: An Investigative Exploration. *Contemporary Educational Technology*, *13*(3), 1–16.

Rahmadi, I. F., Lavicza, Z., Kocadere, S. A., Sri Padmi, R., & Houghton, T. (2021). User-generated microgames for facilitating learning in various scenarios: Perspectives and preferences for elementary school teachers. *Interactive Learning Environments*, 1–13.

Rahmadi, I., Lavicza, Z., & Houghton, T. (2021). Defining Microgames in Education Context. *International Journal of Emerging Technologies in Learning*, *16*(22), 4–16.

Reisinger, M., Kröhn, C., & Sabitzer, B. (2019). Magic Arts as Problem-Based Learning Concept: A STEAM Approach to Introduce Computational Thinking in Lower Secondary Education. *INTED2019 Proceedings*, 9631–9638. 10.21125/inted.2019.2395

Rizzo, K. A., Del Río, L. . S., Manceñido, M. S., & Lavicza, Z. (2019). Linking Photography and Math using GeoGebra. *Bridges 2019 Conference Proceedings*.

Rizzo, K. A., del Río, L. S., Manceñido, M. E., Lavicza, Z., & Houghton, A. (2020). Linking Photography and Mathematics with the Use of Technology. *Open Education Studies*, *1*(1), 262–266.

Rott, B., & Lavicza, Z. (2022). Problem Corner: The Water Well Problem. *The Electronic Journal of Mathematics and Technology*, *2022*(Feb).

Rottenhofer, M., Demarle-Meusel, H., & Sabitzer, B. (2022). Reference Framework for Modeling in Practice: Potentials and Challenges for Teachers. *Society for Information Technology & Teacher Education International Conference*, 67–77. https://www.learntechlib.org/primary/p/220712/

Rottenhofer, M., Hörmann, C., & Sabitzer, B. (2021). Lasst die Spiele beginnen! Mit dem Projekt COOL Informatics spielerisch Computational Thinking Skills fördern. *OCG Journal*, *01*(02), 16–18.

Rottenhofer, M., Kuka, L., Leitner, S., & Sabitzer, B. (2022). Using Computational Thinking to Facilitate Language Learning: A Survey of Students' Strategy Use in Austrian Secondary Schools. *IAFOR Journal of Education*, *10*(2). https://doi.org/10.22492.ije.10.2

Rottenhofer, M., Leitner, S., Emara, M., Sabitzer, B., Demarle-Meusel, H., & Rankin, T. (2022, October). Vocabulary Acquisition through Modeling: A Comparative Study on Visual and Textual Vocabulary Instruction. *4th International Conference on Education Technology and Computers (ICETC 2022)*.

Rottenhofer, M., Leitner, S., Kuka, L., & Sabitzer, B. (2022). Bringing Computer Science Concepts into the Language Classroom: A Case Study on Teachers' and Students' Perception on Modeling to Teach Computational Thinking. *The 20th LACCEI International Multi-Conference for Engineering, Education Caribbean Conference for Engineering and Technology*, 1–8. https://laccei.org/LACCEI2022-BocaRaton/meta/FP89.html

Rottenhofer, M., Otto, K., Sabitzer, B., & Hinterplattner, S. (2020). Modeling as Brain-Based and Creative Learning Strategy. *INTED2020 Proceedings*, 5186–5191. https://doi.org/10.21125/inted.2020.1402

Rottenhofer, M., Rankin, T., & Sabitzer, B. (2020). Grammar Instruction with UML. *2020 IEEE Frontiers in Education Conference (FIE)*, 1–5. https://doi.org/10.1109/FIE44824.2020.9274063

Rottenhofer, M., & Sabitzer, B. (2020). Mit Modellierung zur Lebensrettung. Wie man mit dem Thema Erste Hilfe die digitale Grundbildung umsetzen kann. *OCG Journal*, *1*, 18–19.

Rottenhofer, M., Sabitzer, B., & Rankin, T. (2021). Developing Computational Thinking Skills through Modeling in Language Lessons. *Open Education Studies*, *3*(1), 17–25. https://doi.org/10.1515/edu-2020-0138

Russo, C., & Lavicza, Z. (2018). Reviewing gamification platforms with the aim of creating a gamification editor. *Proceedings of the Conference on History of Mathematics and Teaching of Mathematics*.

Russo, C., & Lavicza, Z. (2019). An overview of gamification and gamified educational platforms for mathematics teaching. *Eleventh Congress of the European Society for Research in Mathematics Education*, *17*.

Sabitzer, B., & Demarle-Meusel, H. (2018). A congress for children and computational thinking for everyone. *Proceedings of the 13th Workshop in Primary and Secondary Computing Education*, 1–6.

Sabitzer, B., Demarle-Meusel, H., & Painer, C. (2019). A COOL lab for teacher education. *Teacher Education for the 21st Century*, 319.

Sabitzer, B., Demarle-Meusel, H., & Rottenhofer, M. (2020). Modeling as computational thinking language: Developing a reference framework. *Proceedings of the 2020 9th International Conference on Educational and Information Technology*, 211–214. https://doi.org/10.1145/3383923.3383960

Sabitzer, B., Groher, I., Hörmann, C., & Hofer, A. (2021). Toward the Implementation of Escape Room Games in an Educational Context. *European Conference on Games Based Learning*, 925–XVI.

Sabitzer, B., Groher, I., Sametinger, J., & Demarle-Meusel, H. (2020). COOL Programming: Improving Introductory Programming Education through Cooperative Open Learning. *Proceedings of the 2020 9th International Conference on Educational and Information Technology*, 95–101.

Schalk, M., Schmidthaler, E., Hinterplattner, S., & Sabitzer, B. (2022). Turning Pages, Scrolling or Swiping: An Evaluation of Interactive Picture Book Applications for Elementary School. *EDULEARN22 Proceedings*, *1*, 4144–4150. https://doi.org/10.21125/EDULEARN.2022.0994

Schallert, S., & Lavicza, Z. (2020). Implementing Augmented Reality in Flipped Mathematics Classrooms to Enable Inquiry-Based Learning. *Proceedings of the 14th International Conference on Technology in Mathematics Teaching - ICTMT 14, Essen, Germany*, *1*, 117–124.

Schallert, S., & Lavicza, Z. (2021). Investigating Mathematics Teachers' Intended Use of GeoGebra in Inquiry Based Flipped Classroom Scenarios. *International Journal for Technology in Mathematics Education*, *28*(3), 117–124.

Schallert, S., Lavicza, Z., & Vandervieren, E. (2022a). Merging flipped classroom approaches with the 5E inquiry model: A design heuristic. *International Journal of Mathematical Education in Science and Technology*, *53*(6), 1528–1545.

Schallert, S., Lavicza, Z., & Vandervieren, E. (2022b). Towards Inquiry-Based Flipped Classroom Scenarios: A Design Heuristic and Principles for Lesson Planning. *International Journal of Science and Mathematics Education*, *20*(2), 277–297.

Schauer, G., Jesacher-Rößler, L., Kemethofer, D., Reitinger, J., & Weber, C. (Eds.). (2022). *Einstiege, Umstiege, Aufstiege: Professionalisierungsforschung in der Lehrer*innenbildung*. Waxmann. https://doi.org/10.31244/9783830995883

Schrammel, N., Tengler, K., & Brandhofer, G. (2020). Lernen trotz Corona. Chancen und Herausforderungen des Distance Learnings an österreichischen Schulen: Ergebnisse von berufserfahrenen Lehrkräften im Vergleich zu Berufseinsteigerinnen und Berufseinsteigern. *R&E-SOURCE*, *14*. https://journal.ph-noe.at/index.php/resource/article/view/893

Soliman, M., Lavicza, Z., Prodromou, T., Al-Kandari, M., & Houghton, T. (2019). Enhancing Kuwaiti Teachers' Technology-Assisted Mathematics Teaching Practices. *International Journal for Technology in Mathematics Education*, *26*(2), 73–80.

Tang, J., Wijaya, T. T., Weinhandl, R., Houghton, T., Lavicza, Z., & Habibi, A. (2022). Effects of Micro-Lectures on Junior High School Students' Achievements and Learning Satisfaction in Mathematics Lessons. *Mathematics*, *10*(16), 2973.

Tejera, M., El Bedewy, S., Galvan, G., & Lavicza, Z. (2022). 3D Printing and GeoGebra in the process of studying mathematics through architectural modelling. *Proceedings of the Third Mathematics Education in Digital Age (MEDA-3)*, 244–251.

Tejera, M., Rivas, F. M., & Lavicza, Z. (2022). Scissors, Cardboard and GeoGebra: Technology as instruments, not only as artefacts. *The 27th Asian Technology Conference in Mathematics (ATCM 2022)*.

Tengler, K. (2020). Klein, kreativ, Ozobot: Förderung von Kreativität und informatischem Denken durch spielerisches Programmieren. *R&E-SOURCE*. https://journal.ph-noe.at/index.php/resource/article/view/825

Tengler, K. (2021). Digital Storytelling–Eine narrative Einführung in informatisches Denken. *INFOS 2021–19. GI-Fachtagung Informatik Und Schule*. https://doi.org/10.18420/infos2021_p209

Tengler, K., Kastner-Hauler, O., & Sabitzer, B. (2021a). A Robotics-based Learning Environment Supporting Computational Thinking Skills—Design and Development. *2021 IEEE Frontiers in Education Conference (FIE)*, 1–6. https://doi.org/10.1109/FIE49875.2021.9637351

Tengler, K., Kastner-Hauler, O., & Sabitzer, B. (2021b). Enhancing Computational Thinking Skills using Robots and Digital Storytelling. *Proceedings of the 13th International Conference on Computer Supported Education - Volume 1: CSEDU*, 157–164. https://doi.org/10.5220/0010477001570164

Tengler, K., Kastner-Hauler, O., & Sabitzer, B. (2021c). Identifying Preliminary Design Principles for a Robotics-based Learning Environment. *2021 16th International Conference on Computer Science & Education (ICCSE)*, 771–776. https://doi.org/10.1109/ICCSE51940.2021.9569250

Tengler, K., Kastner-Hauler, O., Sabitzer, B., & Lavicza, Z. (2021). The Effect of Robotics-Based Storytelling Activities on Primary School Students' Computational Thinking. *Education Sciences*, *12*(1), 10.

Tengler, K., Kastner-Hauler, O., Sabitzer, B., & Lavicza, Z. (2022). The Effect of Robotics-Based Storytelling Activities on Primary School Students' Computational Thinking. *Education Sciences*, *12*(1), 10.

Tengler, K., & Sabitzer, B. (2022). Examining Teachers' Intention to integrate Robotics-based Storytelling Activities in Primary Schools. *International Journal of Interactive Mobile Technologies*, *16*(6).

Tengler, K., Sabitzer, B., & Kastner-Hauler, O. (2020a). First Programming with Ozobots-A Creative Approach to Early Computer Science Primary Education. *Proceedings of the INTED2020 Conference, Valencia, Spain*, 2–4.

Tengler, K., Sabitzer, B., & Kastner-Hauler, O. (2020b). Programming in Primary Schools—Challenges and Opportunities. *Proceedings of ICERI2020 Conference*, *9*, 10th.

Tengler, K., Sabitzer, B., & Rottenhofer, M. (2019). Fairy Tale Computer Science—Creative Approaches for Early Computer Science in Primary Education. *ICERI2019 Proceedings*, 8968–8974. https://doi.org/10.21125/iceri.2019.2152

Tengler, K., Schrammel, N., & Brandhofer, G. (2020a). Learning Despite Corona at Austrian Primary Schools. *Proceedings of ICERI2020 Conference*, *9*, 10th.

Tengler, K., Schrammel, N., & Brandhofer, G. (2020b). Lernen trotz Corona. Chancen und Herausforderungen des distance learning an österreichischen Schulen: Chancen und Herausforderungen des Distance Learnings an österreichischen Schulen. *Medienimpulse*, *58*(02), 37-Seiten.

Trocado, A., Dos Santos, J. M., & Lavicza, Z. (2022). Developing Computational Thinking in Portuguese Mathematics Curricula with Collatz Conjecture. *The 27th Asian Technology Conference in Mathematics (ATCM 2022)*.

Ulbrich, E., El Bedewy, S., Ertl, M., Graz, M., & Lavicza, Z. (2022). Connecting hybrid teaching to hybrid modelling by 3D printing. *Proceedings of the Third Mathematics Education in Digital Age (MEDA-3)*, 256–263.

Ulbrich, E., Elbedewy, S., Handl, J., & Lavicza, Z. (2021). AMazing Mathematical 3D Modeling. *Proceedings of Bridges 2021: Mathematics, Art, Music, Architecture, Culture*, 409–412.

Ulbrich, E., Haas, B., An\djić, B., Elbedewy, S., & Lavicza, Z. (2022). Developing mathematical modelling skills for mathematics teachers through 3D modelling and 3D printing (3DMP). *Twelfth Congress of the European Society for Research in Mathematics Education*.

Ulbrich, E., Lieban, D., Lavicza, Z., Vagova, R., Handl, J., & Andjic, B. (2020). Come to STEAM. We have cookies! *Proceedings of Bridges 2020: Mathematics, Art, Music, Architecture, Education, Culture*, 297–304.

Ulbrich, E., Thrainer, S., & Lavicza, Z. (2022a). 3D Modelling and Playing 3D Games: Three-Dimensional Mathematics to Amaze. In *A Flexible Framework for Hybrid Lower-Secondary Education* (Vol. 1, pp. 69–72). Tallinn University, Tallinn, Estonia.

Ulbrich, E., Thrainer, S., & Lavicza, Z. (2022b). Amazing walks through mathematics: Hybrid workshops at festivals. In *A Flexible Framework for Hybrid Lower-Secondary Education* (Vol. 1, pp. 65–68). Tallinn University, Tallinn, Estonia.

Vágová, R., Kmetová, M., & Lavicza, Z. (2020a). Designing multiple manipulatives to explore cube cross-section. *Mathematics Education in the Digital Age (MEDA)*, 319.

Vágová, R., Kmetová, M., & Lavicza, Z. (2020b). Visual Mental Images' Connected Paper-and-Pencil Iconic and Non-Iconic Representations. *International Journal for Technology in Mathematics Education*, *27*(1), 41–49.

Vitabar, F., Lavicza, Z., & Hohenwarter, M. (2019). Developing professional development programmes with gamification for mathematics teachers in Uruguay. *Eleventh Congress of the European Society for Research in Mathematics Education*, *54*.

Weinhandl, R., Hohenwarter, M., Lavicza, Z., & Houghton, T. (2021). Using GeoGebra Notes to Dynamically Organise Digital Learning Resources and Enhance Students' Mathematical Skills. *International Journal for Technology in Mathematics Education*, *28*(3), 171–182.

Weinhandl, R., Houghton, T., & Lavicza, Z. (2021). A case study on learning basic logical competencies when utilising technologies and real-world objects. *Education and Information Technologies*, *26*(1), 639–653.

Weinhandl, R., Houghton, T., Lindenbauer, E., Mayerhofer, M., Lavicza, Z., & Hohenwarter, M. (2021). Integrating Technologies Into Teaching and Learning Mathematics at the Beginning of Secondary Education in Austria. *Eurasia Journal of Mathematics, Science and Technology Education*, *17*(12), em2057.

Weinhandl, R., & Lavicza, Z. (2018). Introducing teachers to a technology-supported flipped mathematics classroom teaching approach. *Proceedings of the Fifth ERME TOPIC CONFERENCE (ETC 5) on Mathematics Education in the Digital Age (MEDA) Edited by: Hans-Georg Weigand, Alison Clark-Wilson, Ana Donevska*, 289–296.

Weinhandl, R., & Lavicza, Z. (2019a). Exploring essential aspects when technology-enhanced flipped classroom approaches are at the heart of professional mathematics teacher development courses. *International Journal for Technology in Mathematics Education*, *26*(3), 139–144.

Weinhandl, R., & Lavicza, Z. (2019b). Merging flipped learning approaches and learning with ePortfolios in secondary mathematics education. In *In: Triantafyllou, E. (ed.) Gaming Elements and Educational Data Analysis in the Learning Design of the Flipped Classroom*. Aalborg Universitetsforlag.

Weinhandl, R., & Lavicza, Z. (2021). Real-World Modelling to Increase Mathematical Creativity. *Journal of Humanistic Mathematics Education*, *11*(1), 265–299.

Weinhandl, R., Lavicza, Z., Hohenwarter, M., & Schallert, S. (2020). Enhancing Flipped Mathematics Education by Utilising GeoGebra. *International Journal of Education in Mathematics, Science and Technology*, *8*(1), 1–15.

Weinhandl, R., Lavicza, Z., & Houghton, T. (2020a). Designing Online Learning Environments for Flipped Approaches in Professional Mathematics Teacher Development. *Journal of Information Technology Education: Research*, *19*(1), 315–337.

Weinhandl, R., Lavicza, Z., & Houghton, T. (2020b). Mathematics and STEM teacher development for flipped education. *Journal of Research in Innovative Teaching & Learning*, *13*(1), 3–25.

Weinhandl, R., Lavicza, Z., Houghton, T., & Hohenwarter, M. (2021). A look over students' shoulders when learning mathematics in home-schooling. *International Journal of Mathematical Education in Science and Technology*, 1–21.

Weinhandl, R., Lavicza, Z., & Süss-Stepancik, E. (2018). Technology-enhanced Flipped Mathematics Education in Secondary Schools: A Synopsis of Theory and Practice. *K-12 STEM Education*, *4*(3), 377–389.

Weinhandl, R., Mayerhofer, M., Houghton, T., Lavicza, Z., Eichmair, M., & Hohenwarter, M. (2022). Personas Characterising Secondary School Mathematics Students: Development and Applications to Educational Technology. *Education Sciences*, *12*(7), 447.

Weinhandl, R., Schallert, S., & Lavicza, Z. (2020). Towards flipped learning in upper secondary mathematics education. *Journal of Mathematics Education*.

Weinhandl, R., Thrainer, S., Lavicza, Z., Houghton, T., & Hohenwarter, M. (2021). Providing online STEM workshops in times of isolation. *SN Social Sciences*, *1*(6), 1–23.

Wijaya, T. T., Cao, Y., Bernard, M., Rahmadi, I. F., Lavicza, Z., & Surjono, H. D. (2022). Factors Influencing Microgame Adoption among Secondary School Mathematics Teachers supported by Structural Equation Modelling-based research. *Frontiers in Psychology*, 5414.

Wijaya, T. T., Cao, Y., Weinhandl, R., Yusron, E., & Lavicza, Z. (2022). Applying the UTAUT Model to Understand Factors Affecting Micro-Lecture Usage by Mathematics Teachers in China. *Mathematics*, *10*(7), 1008.

Wijaya, T. T., Zhou, Y., Houghton, T., Weinhandl, R., Lavicza, Z., & Yusop, F. D. (2022). Factors Affecting the Use of Digital Mathematics Textbooks in Indonesia. *Mathematics*, *10*(11), 1808.

Wolfensberger, M., Hogenstijn, M., Sørenssen, A. M., Snick, A., & Lavicza, Z. (2020). Transdisciplinarity in higher education: STEAM+ solutions. In *Innovating STE(A)M in Higher Education through Transdisciplinary Talent Programs* (Issue STEAM+ Project).

Wolfschwenger, P., Albaner, B., Kastner-Hauler, O., & Sabitzer, B. (2020). The value of cloud-based learning environments for digital education. *2020 IEEE Frontiers in Education Conference (FIE)*, 1–5. 10.1109/FIE44824.2020.9274223

Wolfschwenger, P., Emara, M., Lumetsberger, W., Hatter, T., Sabitzer, B., & Lavicza, Z. (2022a). The Developer's Journey: A Storytelling Framework for Cooperative Learning in Software Engineering. *Proceedings of the 14th International Conference on Computer Supported Education (CSEDU)*, *2*, 525–533.

Wolfschwenger, P., Emara, M., Lumetsberger, W., Hatter, T., Sabitzer, B., & Lavicza, Z. (2022b). *The Developer's Journey: A Storytelling Framework for Cooperative Learning in Software Engineering*. *2*, 525–533. https://doi.org/10.5220/0011064300003182

Wolfschwenger, P., Hinterplattner, S., Demarle-Meusel, H., Albaner, B., & Sabitzer, B. (2021). Learning under Lockdown: The Conditions in Austria in a Global Context. *CSEDU (1)*, 648–656.

Wolfschwenger, P., & Sabitzer, B. (2020). Effective integration of cloud services into educational organizations. *EdMedia+ Innovate Learning*, 132–137. https://www.learntechlib.org/noaccess/217295/

Zöchbauer, J., Hohenwarter, M., & Lavicza, Z. (2022). Improving the GeoGebra Classroom tool to better accommodate online educational resource development based on the SAMR model. *Twelfth Congress of the European Society for Research in Mathematics Education*.

Zöchbauer, M., J. ,. Hohenwarter, & Lavicza, Z. (2021). Evaluating GeoGebra Classroom with Usability and User Experience Methods for Further Development. *International Journal for Technology in Mathematics Education*, *28*(3), 183–192.