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Digitized Evaluation of Academic Opportunities to Learn (OTLs) Concerning Linguistically Responsive Teaching (LRT): Descriptive Results from Nine Universities

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Abstract: Teachers in Germany are not adequately prepared to teach in a linguistically responsive way. To change that, multiple development and research projects in this area have been established over the past decade. Recent studies show that pre-service teachers still have few opportunities to learn (OTLs) in the field of linguistically responsive teaching (LRT). This study aimed to transfer the theoretical model and the DaZKom test into pre-service teacher training and evaluate LRT-relevant OTLs at nine different universities across Germany with 1649 pre-service teachers. We focused on how LRT-relevant OTLs were perceived by pre-service teachers, how LRT-related OTLs and pre-service teachers' academic backgrounds (course of studies and experience) were related, and how OTLs impacted LRT competence. This study was conducted during the COVID-19 pandemic. Therefore, the teacher training and evaluations were conducted digitally. We found that pre-service teachers report a relatively low number of LRT-relevant OTLs in their studies. In particular, LRT-relevant activities have so far been taught very rarely at universities. Also, different emphases still prevail at universities regarding the qualitative and quantitative offer of LRT-relevant OTLs, because of differences among the nine participating universities. Based on these findings, we recommend that universities offer LRT-relevant learning opportunities in the curriculum.

Keywords: opportunities to learn (OTLs); linguistically responsive teaching (LRT); assessment; transfer

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1. Introduction

Content in teaching is acquired and expressed through language [1]. Therefore, language skills (in the language of schooling) are vital for pupils to access content. Further, language is often a barrier to the learning processes of pupils, especially second-language learners [2]. Although the implementation of topics such as multilingualism or linguistic education in teacher education is legally required in German-speaking countries, teachers have little or no preparation at all for teaching in a linguistically responsive way [2–4]. Over a decade ago, the key desiderata regarding linguistically responsive teaching (LRT) were the following: what teachers need to know to teach in a linguistically responsive way, how they need to be trained, how LRT competence is structured, and which standards need to be set for teacher education in LRT [5]. Since then, much work has been conducted in this area, as the significantly increasing number of research projects in recent years has shown [6,7]. One of them, the BMBF-funded joint project DaZKom [5], considered these desiderata in 2015 and developed a competence model and a corresponding paper–pencil test (DaZKom test). Thus, a standard has been available since then with which both the development of curricula in the field of LRT and their evaluation can be aligned [5].

Additionally, a performance-oriented, video-based test has been available since 2020 to capture action-related competencies besides the cognitive facets of LRT competence [8,9]. The development of the theoretical model and assessment instruments was guided by the

question of which competencies subject teachers must acquire so that they can teach in a linguistically responsive manner. The results of evaluations with the DaZKom test over the past years reveal that pre-service teachers have few LRT-relevant opportunities to learn (OTLs) [10] and that pre-service and in-service teachers show difficulties, particularly in the area of multilingualism [5,11]. A study from 2023 confirms that these results are still relevant. In a study that used a quantitative survey, the authors examined pre-service teachers' experiences and needs for using multilingual methods in their studies. According to their statements, pre-service teachers have minimal experience with multilingual methods during their teacher training. This applies both to talking about the respective methods and to their practice [12].

Universities are challenged in the process of teacher training regarding LRT: pre-service teachers are very heterogeneous in their prior knowledge and experience. Therefore, OTLs need to be adapted to pre-service teachers' prior knowledge and experiences [13]. Furthermore, teacher training in LRT and German as a second language (GSL) is conducted differently in all federal states [1]. Therefore, the design of OTLs in LRT in German teacher education is heterogeneous [1,14]. Mandatory courses, for example, do not provide enough OTLs for pre-service teachers to develop LRT competencies at a medium or even higher level according to the standards set in the DaZKom project [15,16].

Against the background of the need for (a) training teachers to teach in a linguistically responsive way, (b) addressing gaps in previous research, (c) meeting existing challenges, and (d) providing variety in LRT-relevant teacher training, the novel contribution of this study to the literature is a cross-site systematic analysis of the effectiveness of OTLs in teacher education in the field of LRT. This is an important research goal for the subsequent development of similar or more uniform competence standards in teacher training. This study investigates the extent to which student teachers from different teacher education institutions perceive OTLs and the extent to which these are related to their academic backgrounds (course of studies and experience) and competencies. These findings will contribute to improving the training of student teachers in LRT. Owing to the pandemic, evaluating digitized teacher training in LRT was an additional challenge we faced and addressed.

The paper is divided into the following. First, we will provide the theoretical background of the context of LRT and the DaZKom-Transfer project (*DaZKom-Transfer*: Transfervorhaben zu "DaZKom-Video - Performanznahe Messung von Deutsch-als-Zweitsprache-Kompetenz bei (angehenden) Lehrkräften" (2020–2022). Applicants: Andrea Daase, Timo Ehmke, Barbara Koch-Priewe, Anne Köker, Udo Ohm. Funded by the BMBF.). Second, we will introduce the construct of OTLs in LRT and provide an outline of the studies that have been conducted on LRT-relevant OTLs. We will then describe the method and instruments we used to evaluate LRT-relevant OTLs across German universities. Finally, we will report our findings, draw conclusions, and provide recommendations for future LRT-relevant teacher training.

2. Theoretical Background

2.1. Conceptualization of LRT in the German Research Context

LRT [17] is a framework in which linguistically responsive teachers' pedagogical knowledge and skills are outlined to support culturally and linguistically diverse students in mainstream classrooms in aspects such as linguistic knowledge, the principles of second-language learning, the identification of the language demands of classroom tasks, and a repertoire of scaffolding strategies to use for instruction (e.g., extralinguistic support such as visuals and study guides for written texts or translations). The framework also includes the orientations of linguistically responsive teachers in aspects such as valuing linguistic diversity and understanding their need to improve language learners' access to educational opportunities ([17], p. 101). The LRT framework emerged from the older concept of culturally responsive teaching and, therefore, embraces its original key idea of valuing cultural diversity. Therefore, we refer to the concept of LRT with the knowledge that both culturally and linguistically responsive teaching are linked [18].

Because there were no theoretical frameworks on competencies regarding linguistically and culturally responsive teaching in the German research context, the theoretical DaZKom model was developed based on the framework of Lucas and Villegas [17,19], as well as an analysis of 60 German university curricula in the field of GSL and second-language acquisition [5,20,21]. A principal result of the document analysis was that three content-related areas in the field of second-language acquisition and LRT competence could be distinguished in Germany: subject-specific registers (e.g., teachers' knowledge about grammatical structures and semiotic systems), multilingualism (e.g., teachers' knowledge about second-language acquisition), and didactics (e.g., teachers' knowledge about scaffolding) [21]. The developed DaZKom competence model about teachers' professional competence in LRT is linked not only to the conceptual ideas of competence according to Weinert [22] and Hartig and Klieme [23] but to teacher competence studies, such as MT21, TEDS-M, and TEDS-LT [24,25], which focus on teachers' professional development. TEDS-M (Teacher Education and Development Study: Learning to Teach Mathematics), for example, focuses on an international comparison of teacher training using the example of pre-service mathematics teachers to reduce the deficits of empirical educational research in this area [26]. The specific situation in which LRT is not a subject of instruction but constitutes any subject teaching provides a completely new perspective. Research on LRT in Germany originates in studies on German as a second or foreign language [1].

Meanwhile, LRT is substantial for all students, especially regarding academic language at school [17,25,27]. Therefore, with LRT competence, we refer to teachers' competence in teaching their subject in a linguistically responsive way, which is essential for all language learners in mainstream classrooms [28]. Furthermore, we rely on an inclusive understanding of language learners (multilingual learners—MLLs), including their language registers, regional dialects, and other varieties or accents [4], and use MLLs as a linguistically diverse student population.

In educational science and policy, the desideratum of a secure, uniform modeling of teacher competencies as a prerequisite for LRT exists both nationally and internationally. In their review of the status of international research on teacher professionalism in English, Gitomer and Zisk [29], who reviewed the literature on teachers' knowledge regarding English language learners, repeatedly pointed to research gaps in the assessment of teacher competencies in teaching multilingual learners. The studies of DaZKom (the DaZKom-Transfer project and the preceding projects DaZKom [5] and DaZKom-Video [30]) aim to fill the gap in a German research context regarding the competence of the teachers of all subjects to design lessons for all pupils (including MLLs) and to develop educational and subject-specific language skills [21]. Based on the DaZKom model, two test instruments were developed. First, a paper–pencil test was used to measure the cognitive facets of pre-service teachers' LRT competence [31]. Second, a video-based test was used to measure competence in a performance-oriented manner [8,9]. Both have been successfully used at many universities among pre-and in-service teachers to measure participants' LRT competence and thereby evaluate their OTLs during training. Results show that a vast majority of pre-service teachers report only little LRT-relevant OTLs in evaluations with both instruments [2,8,10,30,32]. One aim of the DaZKom project was to connect the content-related facets of the DaZKom model with the specific LRT-relevant OTLs implemented in pre-service teacher training and to measure LRT competence in relation to LRT-relevant OTLs.

2.2. Evaluation of OTLs in DaZKom

OTLs are an essential factor that influences learning in (teacher) education [33]. The importance of measuring and evaluating OTLs and its use has increased [34]. However, the construct of OTLs has not yet been conceptualized [33], despite its contribution to the institutional framing of teacher education [35]. The quantity of OTLs can be described at the structural level [36]. Here, the workload defined in the curricula in the form of courses and credits informs us of the scope of OTLs. OTLs can also be described in terms

of content—an institutionally intended curriculum that contains information on goals and content, teaching and learning methods, control and guidance, instruction and support, and selectivity [37]. Following Osterberg et al. [33], the need for OTLs in the form of institutionally embedded formal courses that provide a teaching–learning setting has arisen (e.g., seminars in a university context). Academic OTLs (in university teacher training) are essential for the development of professional knowledge and for building professional competence in further training [34,37]. Different studies have reported the significant effects of OTLs on teachers' acquisition of content knowledge and pedagogical content knowledge [33]. Acquired competencies of teachers also increase [38]. Further, studies highlight the need for research on OTLs that considers the quantity of OTLs and informs which OTLs impact teachers' beliefs and competence [39].

Against this background, project DaZKom-Transfer (2020–2022) aims to transfer the results of the two predecessor projects into the practice of university teacher training and establish and consolidate cooperation with several teacher-training university institutions in Germany to evaluate LRT-relevant OTLs with LRT tests to obtain feedback on the competence development of the pre-service teacher. By measuring pre-service teachers' LRT competence before and during training, conclusions can be drawn about the quality of the OTLs, such as the research of Stangen et al. [32] who used the short version of the DaZKom test. The findings should flow directly back into the concepts of the courses and the differentiation of the theoretical and empirically founded DaZKom model.

Implementing the scientific findings of previous research into the teacher education system needs evidence-based practices: the reflective use of the best available empirical findings on professional activity—in this case, of the teacher [40]. The transfer of scientific knowledge into practice—here, the knowledge about the importance of linguistically responsive teachers to meet the needs of MLLs in the classroom—presupposes a mediation between these two fields: research and teaching practice. This means scientific results are prepared in such a way that they can provide a basis for evidence-oriented action in the first place [41]. Involving the relevant people (such as teachers and teacher educators) in the project work at an early stage can help address concerns and resistance [42]. The dissemination of scientific findings and innovations from the DaZKom projects (the competency model and test instruments) began during the pilot and norm studies and now continues with validated test instruments. Teachers and teacher educators were involved in the project from the beginning, e.g., as experts in interviews or standard-setting processes [9,43,44]. A vital transfer method in the DaZkom-Transfer project is practical workshops with participating cooperation partners, in which the data continuously collected through the LRT test instruments and the features of academic OTLs that promote LRT competence are exchanged.

To assess LRT-relevant OTLs, we used two different scales with sixteen items on the LRT-relevant topics and with eight items on the LRT-relevant actions that participants might have previously taken in their teacher training programs [11] (see also Section 4.2). LRT-relevant OTLs differ in terms of the content and amount, as well as affiliation with the university (faculty, department, and domain) [6,10]. This highlights the research desideratum: to clarify to what extent universities' LRT-relevant OTLs are similar or different. Four years ago, we presented the results of a standard-setting study (N = 498) using the DaZKom test. In the current study, we focus on the development of LRT-relevant OTLs in university teacher training and repeat studies with a larger sample (N = 1649) from nine different universities across Germany.

2.3. Research Questions

We summarize our theoretical approaches and the research questions that we derived from them. Future teachers still do not have enough OTLs to teach competently in a linguistically responsive way. Teacher education in the field of LRT varies according to the context, approach, affiliation, and scope in Germany. The transfer of (academic) findings into practice and vice versa takes time for many reasons. Two projects have already worked

on a structural model that illustrates the facets of LRT competence: on implementing standards for teacher education in the field of LRT in Germany and on the implementation and evaluation of LRT-relevant OTLs, which have been present for over a decade. OTLs are a complex construct and, depending on how they are designed, address different target groups and facets of competence. We aimed to analyze the significance of LRT-related OTLs at different teacher-educating universities to evaluate teacher training regarding LRT. We also wanted to gain insights into the process of implementing LRT-relevant OTLs into teacher education across Germany over the last few years. We replicated and extended a study from 2018, and, since then, a great deal of research on teacher training has been completed. Our research questions, therefore, are as follows:

1. Which LRT-relevant OTLs (topics and learning activities) do pre-service teachers perceive, and to what extent?
2. To what extent are LRT-related OTLs and pre-service teachers' academic backgrounds related?
3. How do LRT-related OTLs and pre-service teachers' academic backgrounds predict the acquired LRT competence?

3. Method

In this study, we used a cross-sectional design with one point of measurement. To assess pre-service teachers' LRT competence, we used a digital test instrument at different teacher training universities across Germany. Along with the LRT test that was presented as an online survey, we assessed the participants' LRT-relevant OTLs and individual characteristics such as their academic background. For the analysis, we used descriptive statistics and correlations of various scales and conducted a multiple regression analysis. The following subsection details the sampling and introduces the LRT test instrument, additional questionnaires on LRT-relevant OTLs, and the procedure.

3.1. Sample

The sample comprises 1649 pre-service teachers of all subjects and semesters. We employed a purposive convenience sampling. We surveyed pre-service teachers who undergo teacher training in LRT at German universities in courses of cooperating partners such as teacher educators who participated in our network meetings and practical workshops. Advantages were accessibility and the possibility to discuss the results in our workshops and meetings. However, the convenience sample still meets certain conditions that mitigate the typical disadvantages associated with convenience samples, such as over- or under-representation of certain groups. We used a sampling process with respect to the federal states (five out of sixteen states) and geographical regions (east, west, north, and south) to ensure there were no location-related effects on the findings and to determine whether LRT-related OTLs in teacher education were mandatory. As Germany politically consists of 16 federal states (Bundesländer), education policy is a core individual responsibility of different states. Therefore, the states differ in teacher education programs and LRT [1]. Since this study aimed to evaluate OTLs together with LRT competence to learn more about effective LRT-relevant teacher training, it aimed to collect data from different institutions, federal states, and regions. Therefore, data were collected during LRT-related training of pre-service teachers at nine teacher education universities across Germany in 2020 and 2021. We obtained the informed consent of all participants, and this study was conducted according to the guidelines of the German Research Foundation.

Table 1 shows the distribution of characteristics of the sample, such as gender, age, and study subjects at the different surveyed universities. On average, the participants were under 24 years. Of the participants in total, 78% were female and 22% male. The subjects varied and were broadly spread (mathematics, German, English, science, music, history, art, and physical education). In terms of majors, the distribution across the sample was as follows: 60% of the pre-service teachers indicated German as their subject, 30.6% Mathematics, and 44% English. For the analyses, we decided to divide the sample into groups depending on the combination of their subjects of study: 23% did not have any language

subjects (e.g., mathematics and science). Almost 56% had at least one language subject (e.g., German or English), and 21% studied two language subjects. Furthermore, we asked the participants about the school form for which they were trained. Of the participants, 36% studied to become primary school teachers; almost 15% became secondary/middle school teachers after their studies; and almost 31% studied to become secondary school (Gymnasium) teachers. The sample of the nine universities ranged from 33 to 423 students. First, the reason for this variation is differences in student numbers at the universities and in participation and response rates. Therefore, although the sample realized here can be considered extremely large, estimating the accuracy of the measurement is difficult.

Table 1. Sample description.

		University A	University B	University C	University D	University E	University F	University G	University H	University I	Total
Sample size	N [abs]	91	423	125	110	243	63	60	33	501	1649
	N [%]	5.5	25.7	7.6	6.7	14.7	3.8	3.6	2.0	30.4	100.0
Age	M [years]	21.48	24.61	26.34	22.18	23.44	25.75	25.22	22.52	22.42	23.60
	SD [years]	3.97	3.87	6.50	3.79	6.43	6.93	3.70	2.15	3.89	4.87
Gender	Female [%]	84.6%	74.6%	83.7%	89.9%	84.2%	82.5%	75.0%	78.8%	72.1%	78.0%
	Male [%]	15.4%	25.4%	16.3%	10.1%	15.8%	17.5%	25.0%	21.2%	27.9%	22.0%
Subject of studies	German [%]	74.7%	56.5%	60.0%	77.3%	93.4%	87.3%	41.7%	45.5%	53.5%	64.1%
	English [%]	16.5%	22.7%	16.0%	12.7%	84.4%	14.3%	30.0%	15.2%	27.3%	31.5%
	Mathematics [%]	70.3%	52.5%	33.6%	20.0%	93.4%	6.3%	20.0%	45.5%	36.1%	47.8%
Type (based on subjects of studies)	No language subject	14.3%	30.5%	28.0%	14.5%	5.8%	7.9%	26.7%	45.5%	27.5%	23.1%
	One language subject	71.4%	58.6%	63.2%	74.5%	10.7%	81.0%	63.3%	48.5%	62.3%	55.6%
	Two language subjects	14.3%	10.9%	8.8%	10.9%	83.5%	11.1%	10.0%	6.1%	10.2%	21.3%
School form	Elementary school	68.1%	30.3%	22.4%	20.9%	95.5%	1.6%	6.7%	66.7%	19.4%	36.2%
	Secondary school (middle school)	23.1%	15.8%	2.4%	15.5%	0.4%	33.3%	18.3%	24.2%	19.0%	14.8%
	Secondary school (Gymnasium)	4.4%	42.6%	64.0%	31.8%	0.8%	50.8%	0.0%	3.0%	35.1%	30.9%
	Other	4.4%	11.3%	11.2%	31.8%	3.3%	14.3%	75.0%	6.1%	26.5%	18.1%

3.2. Measures

3.2.1. Instruments

The DaZKom paper–pencil test [5] was used to assess LRT. Based on the DaZKom model that is used to illustrate the structure of pre-service teachers' competence in LRT, a paper and pencil test was developed and extensively validated (DaZKom test) [20]. A key indication of the validation study was that OTLs play a major role in acquiring LRT competence. Participants of higher semesters also showed increased LRT competence in the test. The authors assumed that, as the number of semesters increases, there is an increased probability that LRT-relevant OTLs are taken up [45]. The short version of the DaZKom test for measuring LRT competence used in this study consisted of 47 items in nine task units and takes approximately 60 min to complete. Each of these items was assigned to one of the three dimensions in the DaZKom model: subject-specific register (17 items), multilingualism (15 items), and didactics (15 items). Each item consists of an authentic stimulus (classroom interactions, authentic student texts, tasks from mathematics textbooks, case studies, or similar) and an associated task, which is then answered in an open (12 items), semi-open (11 items), or closed response format (24 items) [30]. For example, an item that presents an authentic text-based instruction in mathematics and an associated task can be the following: *With which linguistic references in the text that are relevant to answering the task might MLLs struggle? Explain each difficulty.* This item would be assigned to the subject-specific register dimension [45]. Participants' responses were evaluated using the partial credit system, i.e., two "points" were awarded for a correct

answer and one "point" for a partially correct answer. A comprehensive coding guide was developed for coding the open-ended items [45]. The test had an overall reliability of $\alpha = 0.76$ (Table 2). This study was planned before the pandemic but was conducted as an online test (LimeSurvey®). Further details on the test instrument and item construction can be found in Ehmke et al., 2018 [5].

Table 2. Descriptive statistics of two OTL scales and the LRT competence scale.

Scales	Min	Max	M	SD	Cronbach's Alpha
OTL topics	0.00	3.86	1.40	0.80	0.88
OTL activities	0.00	4.00	0.44	0.55	0.80
LRT competence	−5.60	1.80	−0.07	0.69	0.76

For LRT-relevant OTLs, we used two different scales with sixteen items on LRT-relevant topics that the participants might have discussed during teacher training ($\alpha = 0.91$) [10] and eight items ($\alpha = 0.83$) [10] on LRT-relevant actions the participants might have taken before their in-teacher training. According to the three (sub-)dimensions and facets of the theoretical DaZKom competence model, the topics can be subdivided into the following areas: subject-specific register (e.g., areas of linguistics and the grammar of the German language), migration (e.g., migration and multilingualism, and linguistic diversity in school), and didactics (e.g., language diagnostics and language promotion). The scale with LRT-relevant activities included activities such as analyzing examples of the concrete language acquisition of learners with GSL or analyzing the use of language in an authentic classroom interaction [10]. Both scales used a five-point Likert scale: (0) never, (1) in one session, (2) in several sessions, (3) in a course, and (4) in several courses [11]. The scale with the OTL topics was preceded by the following question: To what extent have the following areas been addressed throughout your teacher education program to date? The OTL activities were queried using the question: How often did you follow the courses? The scale's reliability (Cronbach's αtopics = 0.88 and αactivities = 0.80) was good. The descriptive values of all three scales (LRT competence, OTL topics, and OTL activities) are presented in Table 2.

3.2.2. Analyzes

We analyzed the descriptive statistics and correlations of various scales (DaZKom test, participants' academic background data, and LRT-relevant OTLs) and conducted a multiple regression analysis with SPSS 26 (IBM 2019) to determine a prediction of the LTR-relevant OTLs (topics and activities) according to university pre-service teachers' academic backgrounds, while controlling for the variable of the university the participants were surveyed at. We also compared the bivariate correlation with the multiple regression analysis to evaluate how the variables are related and how these relationships change under control. To analyze the interplay between the personal characteristics, the number of OTLs, and LRT competence, we analyzed these variables in a path model. We used the MPlus 6.12 software [46] to estimate two models with each of the OTL scales: OTL topics and OTL activities.

4. Results

4.1. Which LRT-Relevant OTLs (Topics and Learning Activities) Do Pre-Service Teachers Perceive and to What Extent?

The scale *LRT topics* was used to ask about the frequency with which LRT-related topics were covered in the courses evaluated in this study. Table 3 shows the percentage frequencies of the use of LRT-relevant topics. The topics—"(sub)fields of linguistics (e.g., syntax, semantics, morphology)" (42 percent of the participants covered this topic in several courses during their studies), "Dealing with heterogeneity" (26 percent of the participants covered this topic in several courses during their studies), and "German grammar" (20 percent of

the participants covered this topic in several courses during their studies)—covered three areas that pre-service teachers most frequently mentioned. On average, the participants in the sample covered these topics in several sessions. Contrastingly, the areas of "language level diagnostic" and "language systems of family languages (e.g., Turkish, Russian)" were known to only a few participants. Of the participants, 73 percent and 56 percent had not yet encountered this content in any session. Half the participants were familiar with other topics, mostly in one session. This shows that LRT-relevant content was only given a very low priority in teacher education. The mean across all items in this scale was M = 1.40 (SD = 0.80) (see Table 2). Put differently, on average, the participants learned about all these listed topics between "in one session" and "in several sessions".

Table 3. Topics that have been addressed in participants' education (scale: OTL topics). Percentage/OTL.

Topics	0: Not at All	1: In One Session	2: In Several Sessions	3: In One Whole Course	4: In Several Courses
A. (Sub)fields of linguistics (e.g., syntax, semantics, and morphology)	0.19	0.06	0.12	0.21	0.42
B. Dealing with heterogeneity	0.14	0.13	0.28	0.19	0.26
C. German grammar	0.32	0.09	0.21	0.18	0.20
D. Differences between oral and written languages	0.23	0.15	0.31	0.14	0.16
E. Linguistic diversity in school	0.30	0.26	0.29	0.08	0.08
F. Migration and multilingualism	0.32	0.24	0.27	0.10	0.07
G. Linguistic requirements for different forms of presentation	0.34	0.20	0.31	0.09	0.06
H. Acquisition of academic language	0.34	0.22	0.27	0.09	0.07
I. Language and identity	0.34	0.27	0.25	0.07	0.08
J. Phenomena of second-language acquisition	0.40	0.19	0.23	0.12	0.07
K. Language promotion	0.39	0.23	0.23	0.10	0.06
L. Supporting the language learning process through scaffolding	0.54	0.19	0.18	0.05	0.05
M. Language-level diagnostics	0.56	0.19	0.15	0.07	0.03
N. Systems of family languages (e.g., Turkish and Russian)	0.73	0.17	0.07	0.03	0.01

The *LRT actions* scale was used to ask about concrete learning activities. The results are shown in Table 4. Pre-service teachers most frequently reported that they "analyzed language use during authentic classroom interactions". Furthermore, of the participants, 30 percent analyzed texts typical in their field of study regarding the linguistic characteristics of their students with GSL. Contrastingly, 70 percent of participants had not yet seen concrete examples of language acquisition by learners of GSL. Of the participants, 74 percent had not yet analyzed the language level of authentic student texts, the utterances of GSL students, or the typical forms of presentation for their subjects of study as their linguistic requirements. More than 77 percent of the participants had not yet designed a language-sensitive lesson or individual language support plans for their subjects for GSL students. The mean across all items of this scale was $M = 0.44$ ($SD = 0.55$) (see Table 2). Therefore, on average, pre-service teachers became acquainted with LRT-related learning activities either "not at all" or, at maximum, "in one session".

Table 4. Activities that have been addressed in participants' education (scale: *OTL activities*). Percentage/OTL.

Activities	0: Not at All	1: In One Session	2: In Several Sessions	3: In One Whole Course	4: In Several Courses
A. I have analyzed the use of language in authentic classroom interactions.	0.55	0.22	0.16	0.04	0.03
B. I have analyzed texts typical in my field of study regarding their linguistic characteristics.	0.70	0.17	0.10	0.02	0.01
C. I have analyzed the examples of the concrete language acquisition of learners with German as a second language (GSL)	0.70	0.18	0.09	0.02	0.01
D. I have analyzed the language level of students with GSL using authentic student texts or utterances.	0.74	0.15	0.08	0.03	0.01
E. I have analyzed typical forms of presentation for my subject of study and their linguistic particularities for students with GSL.	0.74	0.15	0.09	0.01	0.01
F. I have designed language-sensitive lesson(s).	0.77	0.13	0.07	0.02	0.01
G. I have established individual language support plans for students with GSL for my subject.	0.87	0.07	0.04	0.02	0.00

4.2. To What Extent Are LRT-Related OTLs and Pre-Service TeachersAcademic Backgrounds Related?

Table 5 shows the prediction of LTR-relevant OTLs (scales: topics and activities) according to university pre-service teachers' academic backgrounds. This indicates the correlations between the variables that inform us of the participants' academic backgrounds with the scales of LRT-relevant topics and LRT-relevant activities and shows two multiple regression analyses for the topics and activities. According to the reported correlations, significantly more OTL topics were reported by the female participants who underwent primary school teacher training and by those who have at least one language as a subject of their study. Pre-service teachers for middle school and Gymnasium and those who did not study any language subject reported significantly fewer LRT-relevant OTLs. The first regression analysis (M1) included participants' academic backgrounds and showed that these explain a 20.5 percent variance in the reported LRT-relevant topics. The results indicated specific predictive contributions for age, primary school teacher training, and at least one language as a subject of study. Under the control of universities, the participants' study of (M2), the "primary school" form, and the language as the subject of studies were significant predictors. Further, some universities were predictors of more OTL topics (C and G), while others seemed to be disadvantageous (A and D). Overall, the academic background explains 25.6 percent of the variance.

The correlation between the participants' academic background and the scale of LRT-relevant activities shows that the older participants and those who underwent primary school teacher training reported more LRT-relevant activities. The regression analysis (M1) revealed age, primary school, Gymnasium, and two languages as subjects of study as predictors of more LRT-relevant activities. Overall, the academic background here explains a 3.1 percent variance. Under the control of universities, the participants' study of M2, undergoing primary school teacher training, and the choice of at least one language as a subject of study are significant predictors of more LRT-relevant activities. Some universities are predictors of more OTL activities (C and H), while universities A and D seem to be disadvantageous (A and D). Overall, the academic background explains a 6.9 percent variance in this model.

Table 5. Prediction of OTL topics and OTL activities by university pre-service teachers' academic background.

	OTL Topics			OTL Activities		
	Correlation	**OLS Regression M1**	**OLS Regression M2**	**Correlation**	**OLS Regression M1**	**OLS Regression M2**
	r	**beta**	**beta**	**r**	**beta**	**beta**
Gender (0 = male, 1 = female)	**0.06**	−0.05	**−0.06**	−0.02	−0.04	−0.05
Age (in years)	−0.03	**0.00**	−0.03	**0.06**	**0.08**	0.04
Training course—primary school	**0.27**	**0.15**	**0.20**	**0.13**	**0.16**	**0.11**
Training course—secondary (middle school)	**−0.09**	−0.02	0.00	−0.03	0.06	0.06
Training course—secondary (Gymnasium)	**−0.15**	−0.01	−0.04	−0.05	0.07	0.03
Training course—other school forms	−0.04	---	---	**−0.05**	---	---
Teaching subjects: two languages	**0.21**	**0.41**	**0.47**	**0.12**	**0.12**	**0.16**
Teaching subjects: one language, one other subject	**0.18**	**0.43**	**0.45**	−0.02	0.06	**0.09**
Teaching subjects: no languages	**−0.42**	---	---	−0.09	---	---
University A	**−0.11**		**−0.16**	−0.06		**−0.06**
University B	−0.02		0.04	0.05		**0.09**
University C	**0.10**		**0.13**	**0.12**		**0.15**
University D	**−0.07**		**−0.06**	**−0.11**		**−0.07**
University E	**0.14**		**−0.10**	**0.10**		0.03
University F	**−0.01**		0.01	**−0.06**		−0.03
University G	**0.11**		**0.06**	0.01		0.03
University H	**0.02**		0.03	**0.08**		**0.09**
University I	**−0.09**		---	**−0.10**		---
R^2 [in %]		**20.5**	**25.6**		**3.1**	**6.9**

Notes: --- = reference group, and bold = significant.

4.3. How Do LRT-Related OTLs and Pre-Service Teachers' Academic Backgrounds Predict the Acquired LRT Competence?

Figure 1 shows the path model with the standardized path coefficients for the application of the two models. The first value in the equation represents the results for model 1, and the second value represents the results for model 2. The correlations marked with * are statistically significant at a level of 0.05. The correlations marked with ** are statistically significant at a level of 0.01. In model 1, the measure of OTLs was the *OTL topics* scale, whereas in model 2 the measure was the *OTL activities* scale. Because both scales are correlated with each other (r = 0.55), the simultaneous inclusion of both scales in one model is unreasonable, because of potential suppression effects. To explain the nested data structure (students within universities), both models were estimated with the "Analysis: type = complex" and university location options as clusters. The model fit was acceptable for both models (RMSEA = 0.00, CFI = 1.0, and TLI = 1.0).

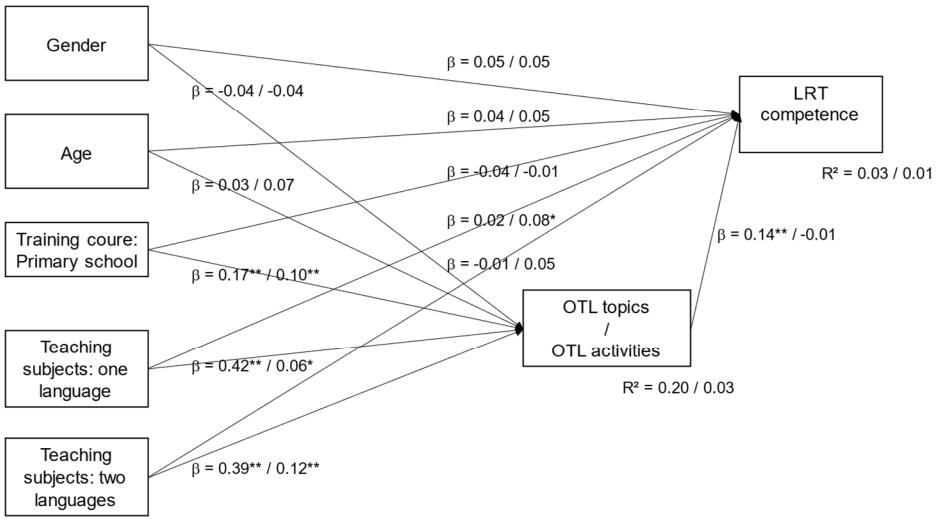

Figure 1. Path model analyzing the relationship between the person characteristics, OTL topics, OTL activities, and LRT competence. * statistically significant at a level of 0.05; ** statistically significant at a level of 0.01.

Model 1 analyzes the extent to which the students' characteristics can be predicted with the *OTL topics* scale and LRT competence. The statistically significant predictors in the scale were the course of study in elementary schools and whether the students studied one or two language-related subjects. Gender and age had no significant predictive powers. For the prediction of LRT competence, only the *OTL topics* scale had a statistically significant predictive contribution. Thus, this finding is plausible. Pre-service teachers who have more OTLs also achieved a higher LRT competence. This entirely mediated all the bivariate correlations between the student characteristics and LRT competence.

In model 2, in which the *OTL activities* scale was used, the path analysis showed a similar pattern of results for the prediction of OTLs by student characteristics as in model 1. However, the coefficients and variance explanations were lower overall than those in model 1. No statistically significant prediction contribution was found for the prediction of LRT competence on the *OTL activities* scale. Previous analyses have shown that students had very few OTLs in this field (Table 4). Presumably, this OTL scale also had no verifiable predictive power.

Only the *OTL topics* scale had a significant predictive effect on the LRT competence, while the *OTL activities* scale did not. To find which specific OTL topics or OTL activities were significant for pre-service teachers' LRT competence, we examined the individual items of the two OTL scales in more detail below.

Table 6 shows the correlations between the extent of the items on LRT-relevant topics and the participants' measured LRT competence. Overall, only small correlations were observed. The highest statistically significant correlations were found for the LRT-relevant topics for (A) Linguistics (r = 0.15), (F) Phenomena of second-language acquisition (r = 0.16), and (O) Supporting the language learning process through scaffolding (r = 0.15). The regression analysis indicated the specific predictive contributions of certain LRT-relevant topics: (A) Linguistics (β = 0.12), (F) Phenomena of second-language acquisition (β = 0.10), (K) Dealing with heterogeneity (β = 0.08), and (O) Supporting the language learning process through scaffolding (β = 0.11).

Table 7 shows the correlations between the LRT-relevant activities and the participants' measured LRT competence. The participants showed significantly higher LRT competence when they analyzed the use of language in authentic classroom interactions. The results of the regression analysis show that this activity was also a predictor of LRT competence (β = 0.12). Surprisingly if pre-service teachers had developed individual language support plans for their subjects before, they would have reached a lower LRT competence. The regression analysis confirms this result (β = −0.19).

Table 6. Correlation and OLS Regression (LRT competence by OLS topics items). Note: Values in bold are statistically significant.

	Correlation	OLS Regression
	r	**beta**
A. (Sub)fields of linguistics (e.g., syntax, semantics, and morphology)	**0.15**	**0.12**
B. Grammar	0.07	−0.02
C. Differences between oral and written languages	**0.12**	0.05
D. Linguistic requirements for different forms of presentation	**0.10**	0.03
E. Acquisition of academic language	0.03	**−0.10**
F. Phenomena of second-language acquisition	**0.16**	**0.10**
I. Migration and multilingualism	**0.09**	0.06
J. Linguistic diversity in school	0.06	−0.07
K. Dealing with heterogeneity	**0.11**	**0.08**
L. Language and identity	**0.07**	−0.01
M. Language level diagnostics	0.05	0.01
N. Language promotion	0.00	**−0.14**
O. Supporting the language learning process through scaffolding	**0.15**	**0.11**
P. Language systems of family languages (e.g., Turkish and Russian)	**0.13**	**0.09**
OTL Topics	**0.14**	
R^2		7.35%

Table 7. Correlation and OLS Regression (LRT competence by OLS activities items). Note: Values in bold are statistically significant.

	Correlations	OLS Regression
	r	**beta**
A. I have analyzed the use of language during authentic classroom interactions.	**0.09**	**0.12**
B. I have analyzed texts typical of my field of study regarding the linguistic characteristics of students with German as a second language (GSL).	−0.02	0.00
C. I have analyzed concrete language acquisition examples of GSL learners	−0.01	−0.03
D. I have analyzed the language level of GSL students using authentic student texts or utterances.	0.02	0.07
E. I have analyzed typical forms of presentation for my subject of study and the linguistic requirements for GSL students.	−0.04	−0.04
F. I have designed language-sensitive lesson(s).	0.03	0.06
G. I have established individual language support plans for my subject for GSL students.	**−0.11**	**−0.19**
OTL Activities	0.00	
R^2		3.65%

5. Discussion

This study contributes to exploring the role of OTLs in teacher education in the area of LRT. The cross-site systematic analysis of the effectiveness of LRT-relevant OTLs investigates the extent to which student teachers from different teacher education institutions perceive OTLs and the extent to which these are related to their course of studies, experience, and competencies. These findings will contribute to improving the training of pre-service teachers in teaching in a linguistically responsive way, as future teachers do not

yet feel adequately prepared and LRT-related teacher education varies across Germany [2]. To assess LRT competence, we used the DaZKom paper–pencil test and used two different scales to evaluate the OTLs: a scale on LRT-relevant topics and a scale on LRT-relevant activities [10]. The analysis yielded the following results:

1. Pre-service teachers report a relatively low number of LRT-relevant OTLs in their teacher training. In particular, activities in the area of LRT-relevant OTLs have so far been taught very rarely at universities.
2. A language-oriented course of study is an essential predictor of LRT-relevant OTLs. All the participants who did not study a language-related subject reported the least LRT-relevant OTLs.
3. The OTL topics predict pre-service teachers' LRT competence. The OTL activities are not predictive in this study. At the level of individual items, "analyzing authentic classroom interactions" and "establishing individual language support plans for participants' subject of studies" were particularly predictive items for competence acquisition.

5.1. Scientific Significance of this Study

With our first research question, we aimed to identify the LRT-relevant topics and learning activities taught at nine German universities. Our study replicates the study of Ehmke & Lemmrich, 2018 [10] to describe the current situation. Compared to the findings [10] from five years ago, we observed a decrease in the mean values for the two OTL scales. This is an unexpected result, as pre-service teachers' preparation for MLLs is mandatory in many German states [1]. One reason might be the slow implementation of education policy decisions [47]. Additionally, teacher education institutions must currently prioritize other topics, such as inclusion or digitalization [48].

For the second research question, we examined the relationship between self-reported LRT-relevant OTLs and student teachers' academic backgrounds. We found that a language-oriented field of study is a significant predictor of LRT-relevant OTLs, confirming previous studies that identified the subject "German" as a critical predictor [10]. Student teachers in language-teaching subjects frequently engage with topics such as linguistics and grammar or meet linguistic requirements for different forms of presentations during their education. Other studies have also shown significant correlations between LRT competence and English as a foreign language (EFL) as a subject of study [31]. This may be because these pre-service teachers covered topics such as the phenomena of second-language acquisition or supported students' language-learning processes through scaffolding in their studies. Another interesting finding is that LRT-relevant OTLs depend on the combinations of subjects that the pre-service teachers studied. Although language-sensitive teaching is required for all subjects, this is not yet reflected in university curricula. Furthermore, the results showed varied emphases among the nine universities from which the participants were selected.

For the third research question, we investigated the extent to which LRT-related OTLs and pre-service teachers' academic backgrounds predict the acquired LRT competence. The path model findings showed that the *OTL topics* scale significantly predicts LRT competence, which is consistent with other studies on LRT competence [49,50]. In contrast, the *OTL activities* scale did not significantly predict LRT competence. This could be due to the overall deficient levels of OTLs reported in this area. At the level of individual items, some specific topics were statistically significant predictors of competence acquisition. Future research should investigate the consistency of these findings in other studies.

5.2. Limitations and Recommendations for Further Research

We see four implications for further research in the following areas in particular.

1. Impact of the COVID-19 pandemic:

The data collection for this study occurred in 2020/2021 during the widespread, worldwide COVID-19 pandemic. It is unclear to what extent the results were influenced by the specific conditions, such as digital teaching and closed schools, which could explain the low proportion of LRT-relevant activities reported. Studies on the pandemic conducted at the University of Trier in summer 2021 indicated that many courses could not take place. LRT-relevant OTLs should be re-evaluated nationwide in Germany now that teaching and internship operations have returned to normal, allowing pre-service teachers to benefit from practical learning experiences.

2. Transition to digital teaching:

The shift from face-to-face to digital teaching has impacted students' learning [51]. Digitalization changes the delivery of educational opportunities, communication and collaboration among stakeholders, and the didactic setting [52]. It remains unclear how the pandemic has influenced the learning situation, motivations, and the data collection. Further studies should explore the development of LRT-relevant OTLs to accurately determine how quantitative and qualitative methods should be developed.

3. Methodological limitations:

Not all the participating universities used the variables when collecting data on academic background items, resulting in missing information, such as the number of semesters studied or degrees achieved (B.A./M.A.). Consequently, we used the students' age as an indicator of their career path. Future studies should more precisely focus on the course that the participants study and their academic background to better predict the variance in reported OTLs regarding scope, content, intensity, focus, target group, etc.

4. Accessibility and inclusivity in education:

LRT courses in teacher education are limited by a number of courses per semester and the maximum number of participants (at least at the Leuphana University in Lüneburg). This raises questions about the accessibility of university studies for all students concerning equity and inclusivity in education. Future research should consider how educational innovations like LRT impact accessibility and how accessibility influences the successful transfer of scientific implications into teaching practice. Researchers should align their questions with the realities of teaching to avoid creating a self-referential academic system [53]. Considering evidence-based practice in teacher education, future research should also examine student teachers' beliefs about LRT-relevant OTLs, as positive beliefs significantly impact OTLs and LRT competence [31,54]

5.3. Implications for Practice and Teacher Education

Three important recommendations for teacher education can be derived from the results of our study.

1. Inclusion of LRT-relevant OTLs:

The extent of reported LRT-relevant OTLs varies depending on the subjects studied by the students. Universities should, therefore, incorporate LRT-relevant learning opportunities in the curriculum, particularly for students who do not study a language subject. Without separate or additional offerings, these students may receive practically no LRT-relevant OTLs. One approach pursued by some universities is to include LRT-relevant OTLs in the school-based practical phases (ProFale project, Hamburg).

2. Dissemination of effective seminar concepts:

Our study found certain individual OTLs as particularly relevant for building LRT competence, such as "linguistics", "dealing with heterogeneity", or "analyzing language use in authentic classroom interactions". Concepts for higher education seminars should be more widely disseminated among university teachers, and scientific exchanges about them should be encouraged to gather further evidence about effective long-term OTLs. One way to achieve this could be publishing successful and well-evaluated seminar concepts.

3. Integration of subject-specific competencies:

Since language and content teaching are intertwined and LRT is a generic competence for all (pre-service) teachers, more OTLs should be provided for subject-specific teacher training, such as *Language in Mathematics Instruction* (Dominik Leiß, Leuphana University Lüneburg). Competencies, such as using a repertoire of scaffolding strategies for instruction [17], need to be embedded into subject-specific contexts, because instruction differs in every subject. This also highlights the need for teacher educators to develop competencies to teach pre-service teachers effectively. A recent study focused on teacher educators in North Rhine-Westphalia, where all pre-service teachers need to undergo specific training to teach MLLs. Problem-centered interviews with teacher educators of this program (N = 20) revealed that university instructors often face a tension between what they deem necessary for their teaching and what they actually do, due to the module's scope. The authors identified different types of educators based on these interviews. The results showed that teacher educators in this module were transparent and open to exchange with a high level of interest in the best possible preparation of pre-service teachers. This is evidenced by their willingness to participate in this study and regular network meetings of all participating universities [55]. As in our study, networking, exchange, and participation in specific workshops seem to be effective ways to prepare teacher educators to teach in this field.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in this study.

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