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Teacher training for literacy: survey on linguistic diversity in Northern Germany's vocational schools

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Abstract
Countries world-wide face the task of integrating students with various linguistic resources and ways of living into their educational systems. The specifically German institution of vocational schools in Germany is complex and, especially in the subject of German, presents teachers with the challenge of ensuring language and subject learning with a diverse and linguistically heterogeneous student group. Studies show that all students at vocational schools need targeted language education in order to be able to cope with the demands of vocational school and training. However, teachers with a grounding in German as a Second Language (GSL) are the exception, yet. And we have only little empirical evidence about the professional activities of teachers at vocational schools who have acquired further training in GSL. With an online survey among N = 81 teachers at vocational schools in Northern Germany, we are addressing this gap. Our results show that there is a connection between their professional training in GSL and the degree of their awareness for the linguistic side of vocational teaching and reveal a comparison between teachers with and without a background in GSL reveals differences in the approach to vocational language and vocational learning. This is twofold: teachers with in-service training in GSL take language issues more into account in their text-based lessons as well as support the writing and the writing process of all of their students consistently. However, teachers at vocational schools do share a general feeling of not being sufficiently competent when dealing with multilingual classes. In our article we discuss implications for teacher education and teacher training for German vocational schools to make them stronger in preparing for lifelong learning in the 21 century.

Keywords Literacy · Multilingual students · Writing as transferable skill · Writing process · Vocational literacy · Survey · Dual system

Abbreviations

DESI	Deutsch Englisch Schülerleistungen International (German English Student Competencies International)
DaZ	Deutsch als Zweitsprache (German as a Second Language)
DaZKom	Deutsch als Zweitsprache Kompetenzmodell (German as a Second Language Competence Model): The DaZKom model outlines the competencies required for teaching German as a second language. It includes three main content units for teacher education: German and academic language (focus on linguistics), multilingualism and multiliteracies (focus on the learner), and language teaching (focus on the teacher)
GFL	Deutsch als Fremdsprache (German as a Foreign Language)

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EFL	English as a Foreign Language
EUCIM-TE	European Core Curriculum for Inclusive Academic Language Teaching in Teacher Education: This project aimed to develop a core curriculum for teacher education focusing on inclusive academic language teaching. It provided a framework for integrating language support into teacher education programs across Europe
GSL	German as a Second Language
IVET	Initial Vocational Education and Training
KMK	Kultusministerkonferenz (The Standing Conference of the Ministers of Education and Cultural Affairs of the Länder in the Federal Republic of Germany)
OECD	Organisation for Economic Cooperation and Development
SprachKoPF	Sprachliche Kompetenzentwicklung und Professionalisierung von Lehrkräften (Linguistic Competence Development and Professionalisation of Teachers): This initiative focuses on the linguistic competence development and professionalization of teachers. It aims to enhance the language skills of teachers to improve their ability to support students with diverse linguistic backgrounds
SRSD	Self-Regulated Strategy Development
UNESCO	United Nations Educational, Scientific and Cultural Organisation

1 Introduction

Europe, its institutions, its labour market and its people have been in the process of transformation and have been undergoing severe changes [1]. They are witness to superdiversity and multilingualism post migration [2, 3]. The Covid-19-pandemic [4] and the war in Ukraine [5] are examples of current changes that affect all schools, students and teachers alike, and decrease the likelihood for immigrant students "to close the gap" [6]. These changes also affect vocational training [7]. In what way, however, are these processes reflected in vocational teacher education for literacy and writing in text-based lessons? In our article we will show that even if the academic training of teachers has been adapted to superdiverse multilingual literacies, the full potential of these new competencies does not yet unfold in the every-day teaching practices at vocational schools. This may indicate the ongoing process of transformation.

The training of teachers in Germany comprises two stages: the academic study of at least two subject areas taught at school and pedagogy to degree level at university, which is followed by supervised in-class teaching practice and further applied studies. In order to distinguish between the two, we will be referring in the following to the first, theoretical phase by ‚teacher education ' and the second, practical phase by ‚teacher training '.

In the German speaking academic world, the term vocational literacy (*berufsbezogene Literalität*) can be used to refer to specified reading and writing skills that are required for employees to pursue certain occupational pathways. These skills are highly contextualized in that they form the sum of the linguistic skills required in specific occupational contexts. The term also refers to the ability to extract relevant information from specialist texts and to adequately formulate and present results in writing [8, 9]. The German term may be rendered as 'vocational literacy' in English, which is its direct translation [10].

However, 'vocational literacy' is not a term widely used in academic debates on educational issues in the English-speaking world. The concepts it entails—the specific reading, writing and communication skills needed for particular occupations professions—are discussed but are not conceptualised as 'literacy'. The terms used would be 'vocational skills' [11] or 'job-specific skills' [12] to refer to the specific competencies and knowledge needed for a particular occupation. They do not specifically refer to writing and reading in and for the workplace. We argue here – similar to Giera [13] – that what is required is not writing training tailored to the individual workplaces but rather the development of solid writing competencies within the education system to enable students in their future as employees to solve set tasks flexibly and through the application of transferable skills.

Based on the research, it is evident that poor writing skills significantly affect various aspects of professional life, highlighting a critical area for intervention in both educational and workplace settings. Konstantinidou et al. [14] point out that poor writing can lead to misunderstandings and a lack of clarity in written communications, which not only results in operational inefficiencies but can also pose safety risks due to misinterpreted information. This underscores the essential role of clear and effective writing in maintaining smooth and safe workplace operations.

Additionally, Boekaerts and Rozendaal [15] have observed that difficulties in handling writing-intensive tasks can severely impact productivity, with workers struggling to meet deadlines due to inadequate writing skills. This challenge is compounded by a significant gap identified by Neumann [16], which exists between the writing skills that graduates possess and the expectations of employers. This gap suggests that educational institutions need to more closely align their curricula with the practical demands of the workforce to enhance the employability and effectiveness of their graduates.

Moreover, Beaufort [17] highlights that limited writing abilities can hinder professional development, restricting individuals' capacity to transition between roles or industries and limiting upward mobility in their careers. This barrier to career advancement makes it imperative to focus on developing robust writing skills as part of continuous professional development.

The work of Hellne-Halvorsen and colleagues [18, 19] further illuminates how professional credibility can suffer when individuals are unable to produce high-quality written outputs or adapt to the writing conventions of their professional communities. Such challenges not only slow the integration of workers into professional settings but also diminish their trustworthiness and reliability as viewed by colleagues and superiors.

Given these multifaceted impacts, it is clear that targeted writing interventions, such as scenario-based education suggested by Konstantinidou et al. [14], along with a focus on both generic and profession-specific writing skills as discussed by Hellne-Halvorsen et al. [18], are essential. Additionally, incorporating metacognitive strategies, as advocated by Boekaerts and Rozendaal [15], into writing instruction can significantly enhance the ability of professionals to reflect on and improve their own writing practices, thereby ensuring ongoing development and adaptability in their communication skills.

Our specific interest in vocational literacy is focused on the dual system of education in Germany which combines on-the-job training as an apprentice, often in small and medium-sized companies, with compulsory attendance of a vocational school on one or two days per [20]. In this context, we investigate how training in German as a Second Language (GSL) impacts vocational school teachers' preparedness, willingness and practices in linguistically diverse classrooms, specifically in supporting students' linguistic needs, writing processes, and fostering language-aware learning.

It may be important to note that the demographics in vocational schools have changed dramatically over the last few decades: while up to the 1980s, an apprenticeship formed the most common route into the world of work, the number of students attending full-time school after the age of 16 in order to acquire a general higher education entrance qualification (*Hochschulzugangsberechtigung*) has risen sharply: from three percent in 1950 to roughly 35 percent in 2022 [6, 21, 22]. In addition, the influx of migrants has increased steadily (and at times dramatically) since the 1960s, however, with fewer of their children reaching a higher school leaving qualification [23]. This means that vocational schools are now mainly populated by students at the lower end of the attainment level at the end of secondary school, many of whom do not count German as their first language.

To provide a sound foundation, this study defines multilingualism as the ability to use and leverage multiple linguistic resources across diverse contexts, encompassing both functional and cognitive dimensions [24]. Multilingualism in vocational schools is particularly relevant as it influences students' academic performance and vocational skills. Studies highlight that proficient multilingual students may excel in language-based subjects while facing unique challenges in others [24]. This underscores the necessity of integrating multilingual pedagogies that allow students to capitalize on their linguistic repertoires.

Our article approaches the question by first explaining the situation of teaching writing at linguistically heterogeneous vocational schools in Germany in more detail, and then exploring how writing instruction at vocational schools is organised under the conditions of multilingualism. This is followed by a brief classification of GSL competences and an insight into teacher training. In section three, we explain the aims of the study, followed by the methodology and the results of the study and their discussion as well as the conclusion in section four and five. Finally, section six consists of the discussion of our findings and the conclusion (section seven).

2 Writing in Linguistically Heterogeneous Vocational School in Germany

Vocational schools in the German dual system teach general education content as well as theoretical and practical vocational knowledge. Vocational schools have a proportion of 10 to 100 percent of students with a so-called migration background *(Migrationshintergrund)* [25], many of whom are multilingual [26]. It is questionable, however,

whether vocational schools cater for more linguistically heterogeneous pupils. There are only a few teachers with a teaching qualification for German or GSL [27]. For example, in the federal state of Bavaria German classes are taught by all teachers, regardless of their qualifications [27], despite the fact that vocational schools have an increased need for language support for all pupils — which is due to socio-economic and demographic causes mentioned above — as well as increased language requirements in training [26]. Problems are identified in self-directed learning, grammatical skills and in reading and understanding technical vocabulary as well as in distinguishing between every-day and professional language.

Vocational literacy (or the lack of it) gains most visibility in the domain of the written language as this domain is less elusive than the spoken mode. The importance of written competencies (both productive and receptive) has increased, especially in industrial-technical occupations, where the mastery of occupation-relevant text types, such as functional descriptions, is important, but also due to advancing digitalisation, which goes hand in hand with a literate society [28]. Regarding writing skills, vocational students lack in grammar, spelling and expression skills and have difficulties in the production of textual coherence and comprehensibility as well as presenting it in an appropriate and legible way [29]. This highlights the need to promote and improve writing as a central skill in vocational education and training in order to meet the requirements of the modern world of work [30].

In addition, it has been demonstrated that vocational schools are not able to compensate for language deficits from lower secondary level [31]. Particularly students with a first language other than German show difficulties in participating in regular subject lessons. Writing in the subject lessons is one of the biggest problems for these pupils [30, 31]. This is particularly devastating because vocational schools are usually the last stage for students before they enter the workforce [32].

2.1 Writing instruction and job-specific text types in the context of multilingual writing

Writing competences are central for crafting texts that are appropriate for the recipient and the situation [39]. Crossley demonstrates how various linguistic features, such as lexical diversity and syntactic complexity, influence writing quality and development. These findings underscore the importance of continuously assessing and promoting sub-competences in writing education. Additionally, Klein and Boscolo highlight that writing to learn is a self-regulated activity, dependent on the goals and strategies of the writer. This aligns with the need to continuously evaluate which sub-competences students have acquired, are acquiring, and can develop in the future.

Linguistic and cultural heterogeneity, multilingualism, inclusion, social background, aptitude, or gender also play an important role in the selection of appropriate writing tasks to enable competence-promoting writing [28]. Crossley supports this view by emphasizing the role of automated assessment systems and NLP tools in enhancing writing evaluation and development. In this context, it is not only the tasks that should be focused on but also the inclusion of digital technologies from the students' living and working worlds to develop and expand digitalization-related literacy skills. "Thus, teaching and learning with digital writing tools as well as about digital texts and writing settings are indispensable to be able to perform as competent writers in different digital environments." [28].

In this context, the linguistic resources of multilingual learners, including their first-language (L1) competencies, play a pivotal role in shaping their second-language (L2) writing skills. According to the Interdependence Hypothesis, strong L1 proficiency positively impacts L2 literacy development [24]. Moreover, Carbonara et al. (2024) verified that children profit to a high degree from multilingual pedagogics by investigating their narrative skills all their languages at school. Narrative skills function as reliable indicators for metacognitive abilities and literacy [25]. Brown reports moderate to large effect sizes in multilingual French and Arab beginner language programmes [33]. However, many multilingual students in vocational schools lack robust L1 and literacy skills, which can impede their ability to produce coherent and contextually appropriate texts. To address these challenges, targeted strategies such as bilingual writing workshops and explicit instruction in cross-linguistic transfer are crucial. These approaches not only build linguistic bridges between students' L1 and L2 but also enhance their ability to navigate academic and vocational writing contexts effectively [33].

The writing process is a dynamic and recursive activity, rather than a fixed linear sequence. It involves various cognitive operations and psychomotor skills, with writers frequently revisiting and revising their ideas and formulations at different stages [34]. Meta-analyses have identified writing support activities that have a positive influence on learning to write. Phillipp [35] established three distinct levels of such support (cf. Figure 1):

– Promoting lower-hierarchy writing skills, especially writing fluency.

- Promoting higher hierarchy writing skills, such as writing strategies according to the Self-Regulated-Strategy Development (SRSD) approach [36].
- Technical and personal support for the writing process.

Teachers can support learners by giving them feedback on their writing. There are three different components to feedback in the process: Feed-up, Feed-back and Feed-forward. Feed-up relates to answers the question "Where do I want to go?" and contains information about learning goals. Feed-back informs learners about their current state compared to the target state and shows their progress by highlighting both successful aspects of the text and the need for revision. Feed-forward answers the question "How do I move forward?" and provides concrete ways to improve (writing) performance, including suggestions for revision and possible assistance [37]. Effective feedback occurs regularly during the learning process, i.e. formative, and actively involves learners in improving their learning [38]. Formative feedback is distinct from and more effective than summative feedback, which tends to be given at the end of the learning process in the form of grades or comments, i.e. after the writing process has been completed [39] and is no longer open to intervention on process or product. In contrast, formative feedback can be used and built in the revision and rewriting of drafts [40]. It can also be helpful if students are given the opportunity to give each other feedback on their performance (peer feedback). This was taken into account when the educational standards for the general higher education entrance qualification were introduced in 2012 [41] but has yet not found its way into the curricular of vocational schools.

In the context of the workforce, the texts encountered and the writing requirements differ significantly from text types that are dealt with in general education [42]. Efing [43] names a variety of different tasks, text types and written forms of presentation in writing for vocational purposes (including work diaries, reports or complaints). However, there is no complete or definitive list of the most relevant text types that would cover the multitude of individual educational pathways.

The diversity and specificity of writing tasks in vocational education highlight the need for targeted support in developing students' linguistic skills. This is where language awareness becomes a crucial component, as it equips students with the ability to understand and adapt their language use to meet the unique demands of vocational writing. Language awareness is the ability to consciously reflect on and analyze language and its use. It encompasses both explicit metalinguistic knowledge, such as understanding grammar and syntax, and implicit skills, like adapting language to different

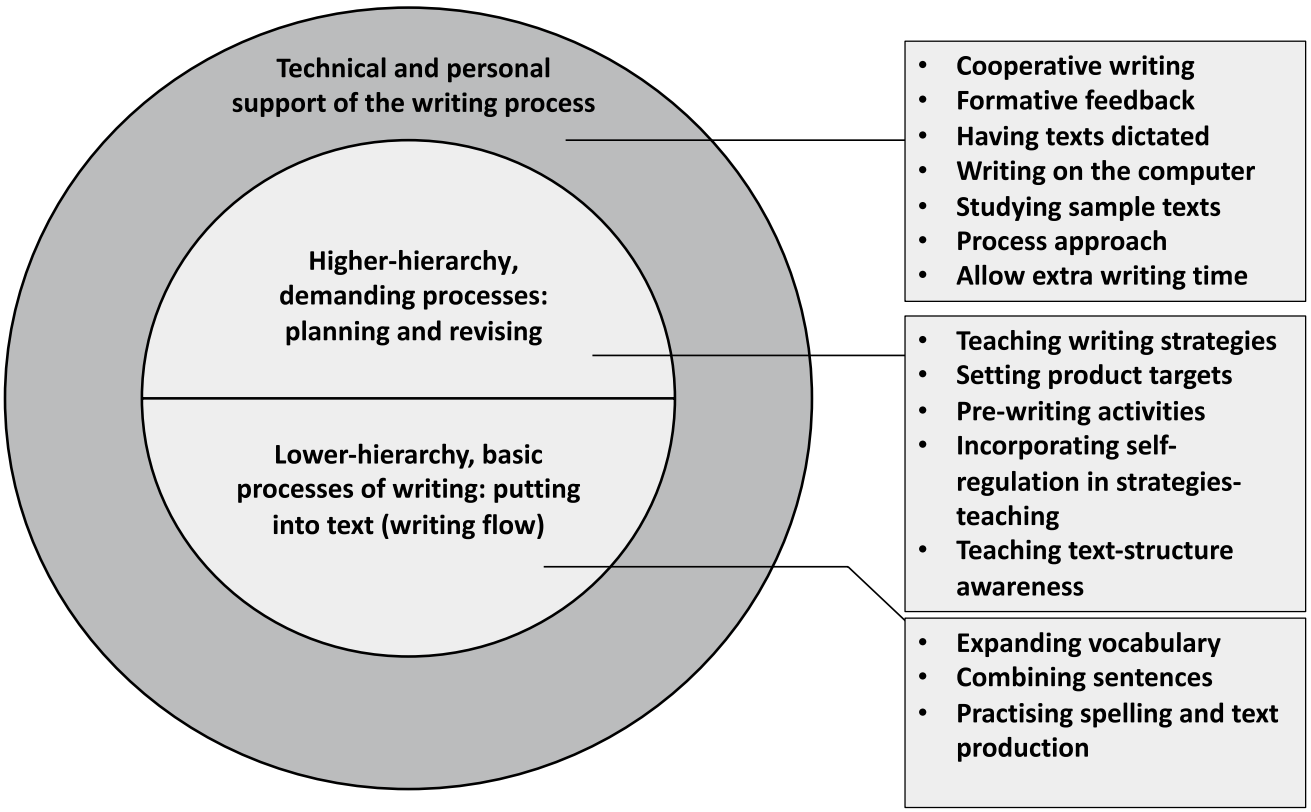

Fig. 1 Situating writing support activities with regard to their specific focal points, according to [35] (own translation)

communicative contexts [44, 45]. In a broader sense, it also includes motivational, emotional, and social dimensions, such as curiosity and sensitivity towards languages in cultural contexts [46]. In vocational education, language awareness is particularly relevant for writing, as it enables students to navigate complex, job-specific text types and adapt their language use to professional contexts, fostering both communicative competence and career readiness [47, 48].

Regarding the writing process, it aims to be similar in any language and independent of the chronology in the acquisition process [35, 49]. Nevertheless, study results indicate [50, 51] that learners growing up multilingually and learners who do not speak German in the family will have a special need for support in writing and multilingual learners should receive special attention in honing of their writing skills [52]. As Müller et al. [50] summarise: In addition to factors such as socio-economic status and parental support, linguistic factors also influence the writing performance of multilingual students. Linguistic resources (e.g. vocabulary, grammar and orthographic skills) are often less developed in their Second Language (L2) [53]. These resources are also less automated in the L2 than in the L1 [54]. As a result, weaker L2 writers use much of their working memory capacity to focus on superficial text features such as spelling and grammar. As a result, even experienced L2 writers have fewer resources available for metalinguistic problem-solving processes such as the generation of ideas [50] and the shaping of textual depth features such as structure and coherence.

2.2 Professionalisation of teaching GSL in vocational training

Over the last decades, vocational schools in Germany have undergone enormous transformations: from the initially merely focussing on the traditional 3-year-apprenticeship programmes for very specific occupational pathways, they have developed into institutions with a much wider scope that are more inclusive from the outset. The layers of transformation concern not only the didactic design of the lessons, but also the range of institutional programmes and qualifications offered as well as the introduction and establishment of the transitional system within the schools, which aims at qualifying students from initial vocational education and training (IVET) to a dual apprenticeship programme [55]. Within vocational training, the linguistic background of trainees now plays a more prominent role than previously: German language learning classes are a special form of IVET while all theoretically-grounded and book-based teaching ought to be language-sensitive in its planning and conducting as well as in the design of teaching materials [56].

The linguistic side of vocational education comprises a variety of aspects: the curriculum, linguistic resources of both students and teachers, assessment methods and examination, teachers' qualification and the teaching itself. In this article, we focus on in-service teachers' perceptions of their professional abilities in linguistically heterogeneous groups of students. By changing our focus from the academic output of graduate students in teacher education (e.g. [57]) to actual application of their previously-acquired knowledge in their teaching practice in vocational schools we offer a new perspective on teacher training for multilingualism.

Incorporating multilingual pedagogies into teacher training programs can significantly enhance teachers' preparedness for linguistically diverse classrooms. Effective practices from Canada and Scandinavia demonstrate the value of embedding multilingual strategies in curricula, such as scaffolding through students' L1 and developing metalinguistic awareness [60–62]. These approaches align closely with the concept of preparedness, which reflects the extent to which teachers feel equipped to address linguistic and cultural diversity. Shaped by the quality of learning opportunities, including coursework on multilingualism and GSL, as well as practical experiences like internships, preparedness is further strengthened through the integration of reflective and structured GSL content that fosters confidence and readiness for inclusive teaching [62–64].

Even more than other schools within the education system, vocational schools are characterised by their heterogeneity. In addition, and like other school types, they are in desperate demand of teachers: nationwide eight percent of teaching posts were not filled in 2022 [64]. In that year, 10.2 percent of all lessons at vocational schools were cancelled and not rescheduled because of staff shortages. However, it is unlikely that this situation is going to change in the foreseeable future: the number of teacher students graduating from university with the requisite qualification for starting teacher training has dropped by 10.5 percent since 2013, while the number of students taking up a degree course in teacher training has dropped by seven percent [65]. Current statistics indicate a shortage of teachers for the subject German/Communication at vocational schools in Lower Saxony [66].

In their 2014 survey Baumann and Becker-Mrotzek [67] established that 45 universities in Germany provide degree courses for vocational teachers in Germany. Just over 40 percent (19 out of 45) of these universities include obligatory GSL-modules for future teachers of German [67]. Compulsory modules for GSL as part of teacher education at university were first introduced in 2007 [68] with Berlin (2007) and North Rhine-Westphalia (2010) being the first two federal states to do so.

The modules offered vary in scope, status and content across universities: from zero credit points to a maximum of twelve credit points. Universities in the reach of our survey in Northern Germany and Hamburg (see below) offer the opportunity to study GSL in optional modules (see above). Optional modules for GSL have been offered e. g. by four out of five universities in Lower Saxony (Göttingen, Hannover, Lüneburg, Osnabrück). While standard degree courses encompass 300 ECTS in total, the credits awarded to the optional courses in GSL at these four universities ranges from three at Osnabrück University to ten ECTS at the Universities of Göttingen and Hannover [67]. In 2017, the University of Hamburg dedicated the equivalent of one [sic!] credit point to GSL-related content, which amounts to 30 h in the entire degree course [67, 68]

Considering the limited time on content—ranging between 30 and 360 h in total—the range and depth of topics is nearly as narrow. With regard to the content areas students ought to cover, the model DaZKom (Competences in GSL) recommends three main content units for GSL-modules in teacher education:

- The German and academic language (focus on linguistics),
- multilingualism and multiliteracies (focus on the learner) and
- language teaching (focus on the teacher) (i.e. Köker et al. [71])

Seminar topics range from general to more specific content areas, which relate to subjects at school. Andreas and Wendland [72] emphasise the necessity of the adequate linguistic-related knowledge within GSL in teacher training. Moreover, their findings illustrate an ongoing process of determining the content areas. Literacy and literacy education, however, have also been a slim part of GSL-modules: In the additional course programme at Karl-Franzens-University Graz (Austria) the lectures on writing and writing didactics were allocated 2,5 CP [73]. The curriculum of GSL in teacher training at university can take on varied emphases [70], however, two main focal points have emerged which appear to profile the course programmes. According to their institutional culture and traditions the programmes are focused either more on literacy and literacy education or on institution wide concepts of (Second) language acquisition and education such as the modules at Berlin universities. Their conceptual foundations lie in EUCIM-TE, SprachKoPF and DaZKom [70, 74]. Yet writing skills and the writing process have not been sufficiently addressed so far.

Same as the overall curriculum and the actual content areas the outcome of university programmes for GSL in teacher training can vary. The evaluation of the Hamburg Programme ProfaLe (one ECTS) [69] points out „that students process the content only superficially and need instructions for applying GSL-knowledge to their subject areas" [69] (own translation).

Following a political, legal and administrative overhaul in the master curriculum in 2015, all universities had to introduce a basic level of knowledge in GSL in all teacher training courses in Lower Saxony. The main competencies aimed for are linguistic- and cultural- sensitive teaching within literacy education in all school subjects and all school types, including for vocational schools. Content units were piloted at eight teacher training universities in the publicly funded project *Umbrüche gestalten* (Designing transformation) [70].

In the 2015 online project survey of *Umbrüche gestalten* experts (N = 97) in the field of vocational education at universities and schools evaluated the relevance of GSL-competences. Even though they were generally considered relevant, the results showed a difference in allocation. Educational practitioners allocated the lowest while lecturers allocated the highest relevance of GSL-competences. Prior contacts with and experiences in GSL increased the rating [70].

Following their implementation, a fair amount of research has been dedicated to questions around the outcome of GSL modules in teacher education over the last decade. However, it is futile to ask to what degree prospective teachers in programmes for vocational education benefit from GSL-programmes as the number of students participating in programme-related surveys, evaluations or tests is very low or even zero. Explanations for this fact range from little inclination on the part of the students themselves to participate of the trainee teachers themselves [75], limited visibility of GSL among other teachers' programmes [76] to no representation of vocational schools at all [77].

As we have seen, the German educational system has been slow to respond to the influx of learners with a first language other than German, which is most noticeable in, and most devastating for schools in the lower tiers of the system and most apparent in the lack of literacy and writing skills of students who are about to enter the world of work. While efforts have been made in recent years to integrate GSL into the curricula of universities that educate prospective teachers, both implementation and uptake of modules have been patchy and slow, and students reluctant to comment on the perceived usefulness of such tuition for their future practice. Therefore, we set out to explore if, and to what extent, awareness of issues surrounding multilingualism and self-perception with regard to the ability to deal with challenges arising from this differ markedly between in-service teachers in vocational schools who do have a qualification in GSL and those who do not. Particular focus is given to their varying practices in the promotion of writing skills.

3 Study aims and hypotheses

To date, there is insufficient data on how multilingualism is addressed in German vocational schools, and whether there is a difference in the practice of teachers who are qualified in GSL, in particular with regard to the development of students' writing skills. Therefore, data on this topic were collected by means of a questionnaire with 184 items[1] [78]. These were self-reported data from teachers who teach German at vocational schools in Lower Saxony and Hamburg. It is postulated that teachers who acquired knowledge in the area of GSL either at university or through continuing education (in the following: teachers with GSL) are more aware of the importance of language support and therefore assist students in writing in the classroom in a more targeted and individualised way than teachers without prior education in GSL (teachers without GSL). Hence the answers of teachers with qualifications in GSL will be compared with the answers of teachers who have no special training or further training in the area of GSL. Building on our theoretical foundations, we formulated the following hypotheses and mapped them to concrete sections of our instrument.

Hypothesis 1: Feeling of preparedness for students' linguistic needs.

Within the cohort, the minority has a formal teaching qualification for GSL. They feel better prepared for actively teaching linguistically and culturally heterogeneous classes than teachers without GSL. Moreover, they feel better prepared for recognising the linguistic needs of their multilingual students as they have been sensitised to the topic. Items DU01, DU02 and DU03 measure teachers' sense of preparedness. The sum score of these items serves as our preparedness index, which we compare between GSL-trained and non-GSL-trained educators.

Hypothesis 2: Writing process.

Teachers at vocational schools specifically support their students' writing. Teachers with GSL initiate the revision of writing processes more often and offer their students more individualized access to writing. Items RS01, RS05 and RS06 measure teaching of the writing process.

Hypothesis 3: Language and literacy awareness

Teachers at vocational schools specifically promote language-aware learning, particularly with regard to the written language learning of their students. Teachers with GSL do this more often than their colleagues without GSL. In Item SB01 we measured the language and literacy awareness.

4 Methods

4.1 Procedure

The digital questionnaire *„Digitale Unterstützung des Schreibens im Deutschunterricht mit sprachlich-heterogenen Lerngruppen—Eine Studie an berufsbildenden Schulen in Niedersachsen und Hamburg"* (Digital Support for Writing in German Classes with Linguistically Diverse Groups—A Study at Vocational Schools in Lower Saxony and Hamburg) [78] was sent to 374 headmasters of vocational schools in Lower Saxony and Hamburg. The various approval procedures for conducting surveys in schools in the federal German states we had in mind meant that we were unable to include individual teachers who might have been very interested. The dependence of the N on the goodwill of the headmasters and department heads, who, despite ministerial approval, forwarded the online links to the respective colleagues or not, is reflected in

[1] The questionnaire consisted of a total of 184 items, which likely contributed to a reduced overall response rate due to its considerable length. A large proportion of the items focused on the relationship between digitalization and writing, which, while important, was not directly relevant to the core research interest in this context.

the sample size of the survey. 81 teachers teaching German/Communication at vocational schools in Lower Saxony or Hamburg participated. The survey was conducted from October to November 2021 via SoSciSurvey.[2]

All experimental protocols for this study were reviewed and approved by the Regionales Landesamt für Schule und Bildung Braunschweig. The ethics approval ensured that the study met all institutional and legal ethical standards.

Informed consent was obtained from all participants involved in the study prior to their participation. Each participant was informed about the purpose, procedures, and potential risks of the study, and provided written consent to participate voluntarily.

All methods were carried out in strict accordance with relevant guidelines and regulations to ensure ethical conduct throughout the research process.

4.2 Sample

95.3 percent of the participants identified themselves as female, 4.7 percent as male and none as diverse. On average, the respondents had been in the teaching profession for 13 years and 93 percent had qualified as teachers of German/Communication. Seven percent obtained their teaching qualification via a qualification after their studies. The largest number of respondents (47.6 percent) assigned themselves to the education program in business and administration, 16.6 percent to social pedagogy.

Only 17 of all participants (N = 81) qualify in GSL. They mostly received their training as an integrated part of their teacher education program and attendance of elective modules within it (cf. Figure 2). Only one of all respondents acquired their qualification after completing teacher training. With 39 years of age on average, the teachers with a qualification are slightly younger than teachers without a GSL qualification in the cohort.

The sample size was relatively small, which may limit the generalizability of the findings. Additionally, the self-selection of participants could introduce bias, as those who chose to participate might be more confident in their teaching practices. The study's reliance on self-reported data is another potential limitation, as it may not fully capture the nuances of teachers' classroom behaviours or the actual impact of GSL training. Future research should consider a larger and more diverse sample, as well as complementary qualitative data to gain deeper insights into teachers' experiences and practices in linguistically diverse classrooms.

4.3 Data collection

The questionnaire used 184 items and includes validated scales from DESI [79] and DigiKompEL [80], among others, as well as specially created items on topics such as linguistic differentiation in the classroom, the promotion and practice of writing by teachers, their self-assessment of their own digital competences and their use of digital writing tools.

The entire questionnaire was validated and piloted through cognitive interviews [81] with future teachers (N = 11). Items taken from DESI were also linguistically adapted and expanded to include the subject of writing tools. Here, the teachers rated aspects of their (writing) lessons on a four-point scale from 1 (not important) to 4 (very important) or frequencies of methods used etc. on a four-point scale from 1 (never) to 4 (several times a week). The original scale *"Schreibförderliche Unterrichtselemente"* (DESI) consists of 16 items and demonstrated good internal consistency in previous studies (Cronbach's α = 0.79; N = 310). For the purpose of this study, the scale was divided into two theoretically grounded subscales in order to differentiate between RS01 and RS05. The reported reliability refers to the full scale; separate reliabilities for the subscales are not available. The scale *"Language Awareness in Teaching"* was used in its original form as provided in the DESI instrument (SB01). It consists of 5 items rated on a 4-point frequency scale (1 = never; 4 = several times per week). The scale showed high internal consistency in the original study (Cronbach's α = 0.84; *N* = 313). Item-total correlations (*rit*) ranged from 0.60 to 0.71, indicating good homogeneity. The reported mean was *M* = 2.44 (*SD* = 0.51; theoretical range: 1–4). For the items DU01, DU02, DU03, and RS03, no validated scales are available; these items were used in their original form as individual indicators.

In the analysis of the quantitative data, cases with missing data were excluded to ensure the validity and reliability of the results. The primary statistical method employed was the independent-samples t-test, used to compare the responses between teachers with and without GSL (German as a Second Language) qualifications. Descriptive statistics, including

[2] The low response rate might be partly due to the timing of the survey, which coincided with the period of the COVID-19 pandemic. During this time, many teachers reported being overwhelmed by a high volume of emails. Additionally, the method of forwarding inquiries through school administrations to the teachers may have adversely affected the response rate.

Fig. 2 Percents of qualifications in GSL. Question: "Did you deal with German as a Second language within the programme of study? If so, how?" (own representation)

means and standard deviations, were reported to provide an overview of the sample characteristics and to describe key variables, such as the teachers' self-assessment of their preparedness to address linguistic diversity in the classroom.

5 Results

5.1 Hypothesis 1: feeling of preparedness for students' linguistic needs

17 active teachers have graduated from a program that included GSL. They are the minority within the cohort (N = 81). The vast majority (79 percent) of the teachers in the cohort does not have a formal qualification to teach GSL at school. GSL has not been part of their teacher program (neither as obligatory nor as elective modules) or they do not recall whether they have an actual qualification. One fifth of the cohort has graduated from a program that includes GSL.

There is no difference concerning the perception of students' multilingualism between teachers with and without GSL.[3] The range of responses varies both between and within the groups of teachers. However, the estimated mean values between the groups of teachers with GSL (M = 8.2) and teachers without GSL (M = 7.5) do not show any marked difference and are not significant. This could be due to the fact that the number of test participants was too small. It indicates nonetheless that the effect is not particularly large and that teachers who have been sensitised to the topic of multilingualism in the course of their studies are not necessarily more aware of their pupils' multilingualism among their students and the linguistic potential for teaching.

As multilingualism has many facets, estimating multilingualism in a group at school can produce very varied results. This is reflected in the high standard deviations (with GSL s = 5.8; without GSL s = 7.2). It becomes clear that the teachers within the groups already have very different perceptions of the multilingualism of their students. While some state that 30 students in their class are multilingual, others state that they have no none at all in their classes.

[3] In the survey, the teachers should always refer to the class in which they had last taught German at the time of the survey, so that their own self-reporting would be oriented as specifically as possible to a class and not reflect a general feeling on the part of the teachers. When asked how many pupils they knew to be multilingual, the teachers were asked to give whole numbers.

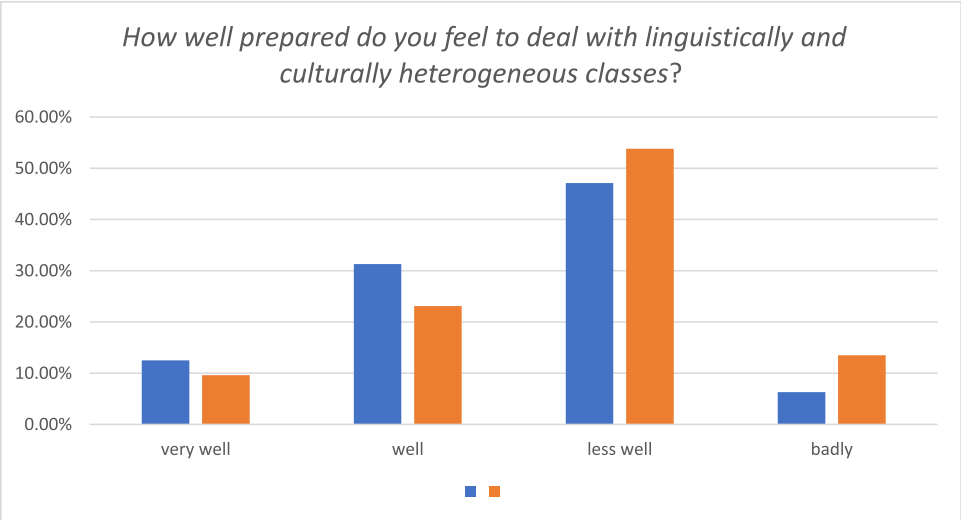

Fig. 3 Percentage of responses to item „How well prepared do you feel to deal with linguistically and culturally heterogeneous classes" (own representation)

Since topics of multilingualism and cultural heterogeneity would have to be explicitly addressed within an initial and in-service training with GSL, it is hypothesised that teachers with GSL would feel better prepared to deal with linguistically and culturally heterogeneous classes.

To examine whether teachers with and without formal training in German as a second language (GSL) differ in their perceived preparedness for working with linguistically and culturally heterogeneous classrooms, an independent samples t-test was conducted. Teachers without GSL training reported significantly higher levels of preparedness (M = 3.00, SD = 0.75) compared to their GSL-trained colleagues (M = 2.50, SD = 0.82), t(40) = -2.03, p = 0.049.

The effect size, calculated using Cohen's d, was d = -0.65, indicating a moderate and practically relevant difference. A post-hoc power analysis (α = 0.05, $n_1 = 16$, $n_2 = 26$, d = 0.645) revealed a statistical power of 63.7%, which is below the commonly recommended threshold of 80%. This implies a moderate risk of a Type II error, and the result should thus be interpreted with some caution regarding its generalizability.

These findings are in line with the descriptive statistics: In general, teachers without GSL training reported a higher sense of preparedness for dealing with linguistic and cultural diversity (cf. Figure 3). Specifically, 11.8% stated feeling very well prepared and 15.2% well prepared, compared to only 6.5% and 15.2%, respectively, among those with GSL training. However, the majority in both groups reported feeling less well or poorly prepared (53% with GSL training; 56.5% without). Notably, the proportion of GSL-trained teachers who felt well prepared (11.8%) is nearly matched by those who felt poorly prepared (13%), suggesting a critical and reflective perspective within this group.

5.2 Hypothesis 2: writing process

The analysis of writing instruction practices (RS01 items) reveals small to moderate effect size differences between teachers with and without training in German as a Second Language (GSL). While students of non-GSL-trained teachers are more likely to correct their writing independently (d = -0.64) and to bring in their own texts (d = -0.42), GSL-trained teachers more frequently provide structured support, such as digital correction tools (d = 0.26) and writing prompts (d = 0.31).

An independent samples t-test was conducted to examine group differences in the support of the writing process (*Prozess* scale) between teachers with and without training in German as a Second Language (GSL). Teachers without GSL training reported slightly higher levels of process-oriented writing support ($M = 2.10$, $SD = 0.37$) compared to their GSL-trained counterparts ($M = 1.98$, $SD = 0.48$). The mean difference of 0.12 did not reach statistical significance, and the associated effect size was small (*Cohen's d* = -0.28).

A post-hoc power analysis (G*Power, $d = 0.28$, $\alpha = 0.05$) yielded a statistical power of only 14.1%, far below the commonly recommended level of 80%. This indicates that the study was not sufficiently powered to detect small effects, and the absence of a significant group difference should be interpreted with caution.

Nevertheless, the descriptive pattern aligns with other observed tendencies in this study, suggesting that teachers without GSL training may place slightly greater emphasis on process-related writing activities, possibly reflecting a broader orientation toward student autonomy and active engagement in text production.

An independent samples t-test was conducted to assess group differences for item RS06, which refers to whether teachers address complex text types in their lessons. Descriptive results indicate that 82.8% of GSL-trained teachers reported incorporating complex texts, compared to 76.5% of non-GSL-trained teachers, suggesting a slightly higher level of attention among the GSL group. However, the mean difference between the groups ($M = 1.16$ vs. $M = 1.24$) was not statistically significant, $t(40) = -0.60$, $p = 0.553$.

The effect size was small (*Cohen's d* = -0.19), and the 95% confidence interval for the difference [-0.33, 0.18] included zero, indicating that the observed difference may be due to sampling variation. Although the numerical trend points toward greater emphasis on complex texts among GSL-trained teachers, this finding lacks statistical confirmation.

Nonetheless, the relatively high percentage of teachers in both groups who report addressing complex text types indicates that this is a commonly recognized instructional goal in vocational education. The slight advantage in the GSL group might reflect stronger awareness of text complexity in heterogeneous classrooms, but further research is needed to substantiate this assumption.

Teachers in vocational schools support the writing processes of their students in diverse ways. However, the integration of digital writing tools is not yet widespread [78], and differences between GSL and non-GSL teachers in this domain are not particularly pronounced.

With regard to feedback practices, formative feedback appears to be provided more frequently by GSL-trained teachers, while students of non-GSL-trained teachers more often correct their own writing without guidance. Moreover, non-GSL teachers tend to give more work-related writing tasks, pointing to differences in instructional focus.

The analysis of writing instruction practices among vocational school teachers reveals nuanced but consistent differences between those with and without training in German as a Second Language (GSL). While most effect sizes remain small to moderate, they suggest differing instructional preferences and pedagogical emphases between both groups.

Teachers without GSL training more frequently involve students in independent and collaborative writing processes, including peer correction, joint writing, and text presentation. For example, the strongest difference appears in the practice "Students read aloud or present their texts" (d = -0.51), with higher means among non-GSL teachers. Similarly, joint writing is more common in this group (d = -0.66). These findings reflect a greater emphasis on learner autonomy and expressive writing.

In contrast, GSL-trained teachers report slightly more use of digital support tools (e.g., automated correction: d = -0.33) and provide more structured feedback, although the differences are not statistically significant. (cf. Figure 4). An independent samples t-test was conducted to examine differences in feedback practices between teachers with and without training in German as a Second Language (GSL). While the difference in mean scores between GSL-trained teachers ($M = 2.59$, $SD = 0.38$) and non-GSL-trained teachers ($M = 2.83$, $SD = 0.54$) did not reach statistical significance, $t(33) = -1.55$, $p = 0.132$, the effect size was moderate (*Cohen's d* = -0.54), suggesting a practically meaningful difference.

A post-hoc power analysis (G*Power, $d = 0.54$, $\alpha = 0.05$) revealed a statistical power of approximately 33%, which is well below the commonly recommended threshold of 80%. This indicates that the non-significant result may be due to an underpowered design rather than the absence of a true effect.

The descriptive trend shows that non-GSL teachers tend to report slightly more frequent use of feedback practices. This includes elements of feed-forward (e.g., suggestions for improvement), feed-up (e.g., text presentations), and feedback (e.g., in-class text discussion and revision). While these tendencies are not statistically confirmed in this study, they align with broader patterns observed across other writing support items.

Asked more specifically about feedback, all teachers report providing different forms of feedback, covering aspects of Feed-forward (e.g., "I give the students constructive feedback with suggestions for improvement."), Feed-up (e.g., "Pupils read out their written texts or present them publicly."), and Feed-back (e.g., "I discuss the texts with students", or "Students revise their texts in class."). Across these different strategies, 78.8% of all teachers state that they frequently offer such feedback. However, only 63% of teachers without GSL training report using these methods frequently. This suggests a notable difference in the depth and frequency of formative feedback practices between both groups.

In sum, while both groups actively support students' writing development, GSL-trained teachers appear to rely more on structured, formative strategies, including digital tools and comprehensive feedback. Non-GSL teachers tend to foster more autonomous and product-focused writing, often oriented toward authentic, work-related genres. Although most differences were not statistically significant, the observed patterns point toward distinct pedagogical cultures and priorities in writing instruction.

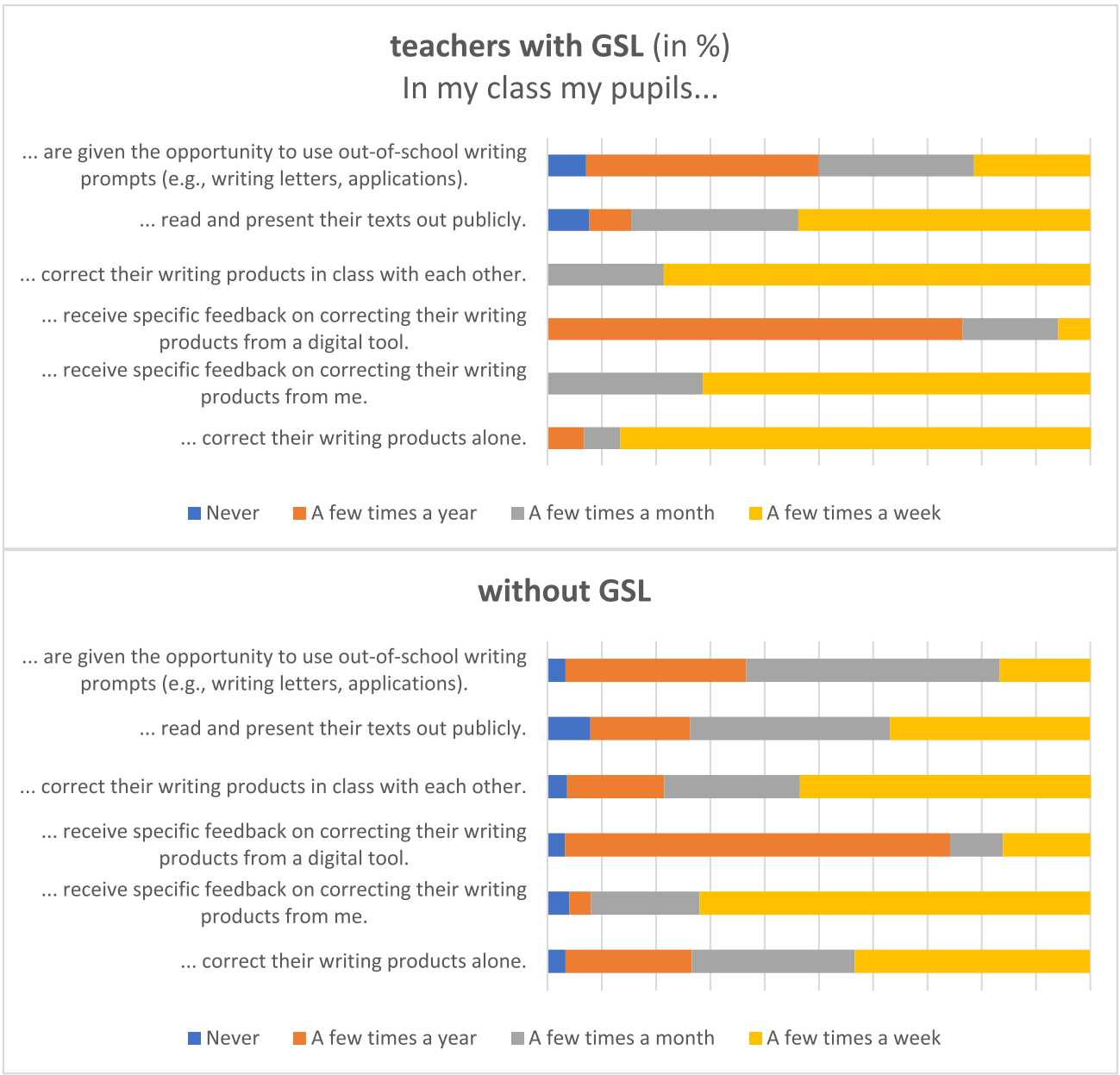

Fig. 4 Comparison of agreement to statements regarding teachers' own practice (RS05) (own representation)

5.3 Hypothesis 3: language and literacy awareness

Both teachers with GSL and teachers without GSL promote the development of language awareness among their students. However, it is noticeable that teachers with training in GSL on average address all the investigated areas more frequently in their lessons, with the exception of the differences of writing for different occasions (cf. Figure 5). This points to a difference in language and literacy awareness among teachers. This difference becomes very clear in its visibility when reflecting on writing as part of their everyday teaching.

Descriptive analysis of the overall scale "Language Awareness in Teaching" confirms this tendency: teachers with GSL training reported slightly more frequent integration of language awareness activities ($M = 2.84$, $SD = 0.63$) than teachers without GSL training ($M = 2.69$, $SD = 0.55$). However, the group difference was not statistically significant ($t(41) = -0.87$, $p = 0.390$), and the confidence interval for the mean difference [-0.52, 0.21] includes zero. Still, the calculated effect size (Cohen's $d = -0.27$) suggests a small tendency in favor of GSL-trained teachers.

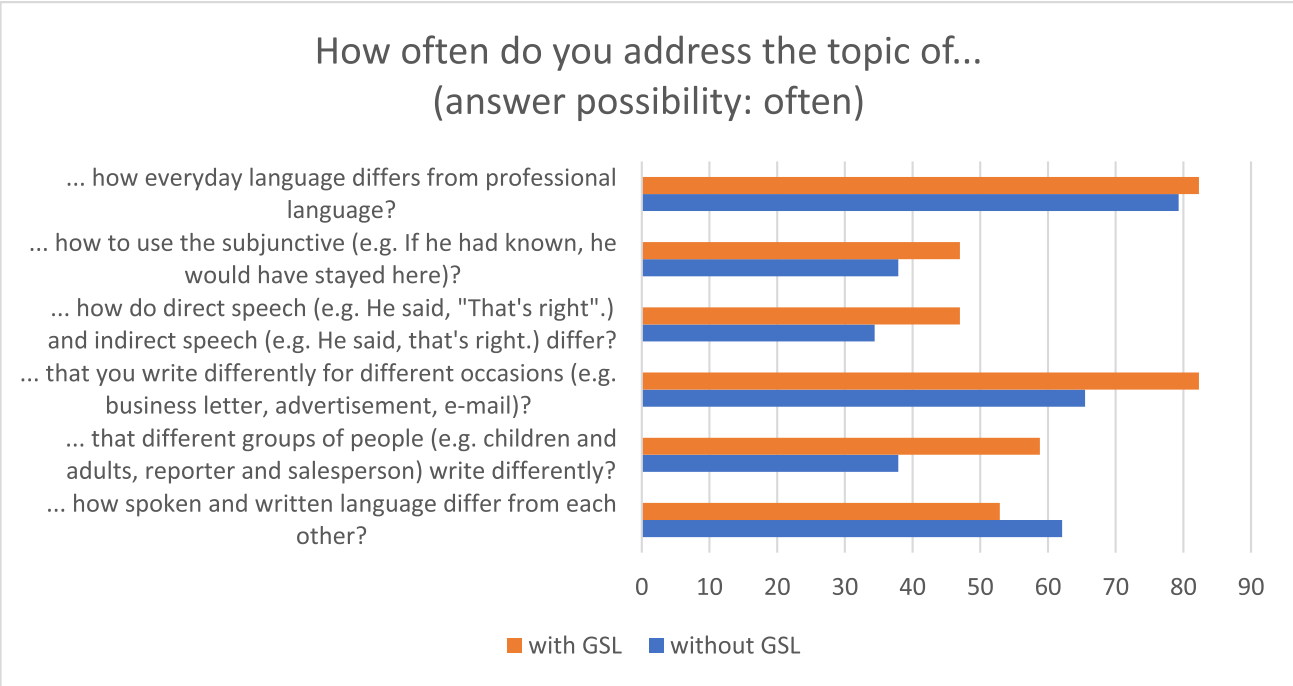

Fig. 5 Comparison of 'often' given as response in relation to language-awareness teaching (own representation)

A post-hoc power analysis based on the observed effect size (d = 0.27) and the actual sample sizes revealed a statistical power of only 13.6%, which is substantially below the recommended threshold of 80%. This low power indicates that the absence of a statistically significant result may reflect a lack of sensitivity in the study design rather than the absence of a true difference.

6 Discussion

In summary, our expectation that the majority of in-service teachers are not formally qualified in teaching GSL was confirmed; indeed only one out of five holds a relevant formal qualification in this area. This can be explained by the fact that the majority of teachers surveyed started teaching at school shortly before GSL modules were introduced as a part of teacher education at universities in the federal states of Hamburg, Lower Saxony and Schleswig–Holstein (after 2015).

Unsurprisingly, teachers with GSL feel better prepared on average to deal with linguistically and culturally heterogeneous classes. They are more likely to integrate aspects of language awareness into their lessons. This suggests that specific preparation in GSL can lead to increased sensitisation and competence in dealing with multilingualism.

Despite these trends, the data from our study shows only minor differences between teachers with and without GSL: there is no significant difference in the perception of multilingualism among students between the two groups. The differences are also minimal in terms of writing instruction and the feedback given to students.

That the differences in teaching practice between the two groups of teachers are only minimal could be due to several factors. Firstly, the historical development of GSL training reflects that it has not always been an integral part of teacher education and has only gradually become established [76]. The history of multilingualism in German classrooms starts in the 1970s when the children of the so-called *Gastarbeiter* (guest workers) first entered the school system [76]. Attendance at school up to the age of 18 is mandatory for all permanent residents of Germany. The obligation to attend school has always been applied to all children and teenagers alike, irrespective of their national or linguistic background. Given this timeframe, it may be surprising that the inclusion of GSL as a regular part of teacher training programmes is still far from being the norm in Germany, its extent varies considerably across the federal states and it is often an optional rather than a compulsory component, i.e., preparation for teaching GSL does not constitute *Ausbildungsnormalität* (normality in teacher training) [74, 75, 82].

The minimal differences in writing instructions are based on self-reports and could represent beliefs about self-efficacy [83] in both groups of teachers. As the explanatory power of this social-cognitive construct is limited [84] a variety of questions remain to be answered. So far empirical results open up into two directions of investigation, the individual and the contextual: Within multilingual contexts self-efficacy correlates with a critical reflection of the teachers' professional identity as well as a less deficit-oriented view of their students and contextual factors [85]. Demographic and background factors influence the levels of self-efficacy [86]. Empirical results for self-efficacy among primary schools teachers also point towards a stronger focus on the school context [87].

In teaching at vocational schools and teacher training this may result in different attributions of what is relevant and important for teaching and learning and what is not. Andreas and Wendland [72] have shown this effect for linguistic content area among students in teacher education (N = 142).

Secondly, the lack of compulsory GSL modules at universities and the limited depth and breadth of content offered could reduce the effectiveness of the training. Thirdly, the shortage of teachers and the high attrition rate at vocational schools may mean that teachers face similar challenges regardless of their preparation. Finally, the practical implementation of GSL in the classroom may be hampered by the unavailability of resources and support. The teaching environment needs to be improved as a ground for the additional teaching competences to prosper. This imperative, however, is unbalanced as Lower Saxony has fewer students with a multilingual background than other states in Germany and is dominated by large rural areas and medium-sized cities [66].

Nonetheless, teachers both with and without GSL training report that they feel sufficiently equipped to support their students' writing skills. They have adequate resources and feel able to meet the needs of students whose first language is not German or why may have only basic knowledge of the language. This is seemingly at odds with the expected benefits of GSL training and the general situation of teachers in view of teacher shortages and increased workloads.

For teachers, as for all other professionals, further and in-service trainings pose the opportunity to continue and upgrade their knowledge and competences. These trainings face a very heterogeneous group as teachers differ demographically, in their specialization, expertise and content area as well as in their attitudes and beliefs and their motivation to participate in trainings once they are fully qualified [82].

Finally, it should be noted that the informative value of the present study is limited. The sample size is too small to draw representative and definite conclusions. The sample itself was self-selecting which may point to a greater degree of contentment with their own teaching practices. However, the results indicate some issues that require further attention in a teaching environment increasingly characterised by multilingualism. A qualitative supplement to the quantitative data could provide additional insights and would therefore be desirable in order to gain a more comprehensive understanding of the topic.

On the basis of research showing that in the federal state of Bavaria only 12 percent of tutors teaching German and Communication are actually in possession of the required qualifications of *Staatsexamen* (state examination) in the subject area [27, 28], it can be assumed that a low percentage of formally qualified teachers in vocational schools in other regions is also, if not equally, low. According to our research, similar statistics for the federal state of Lower Saxony are not made public. The number of teachers with a qualification for teaching GSL is even lower [27, 28].

The number of GSL-programmes in teacher education has increased since the overhaul 2015 at universities in Lower Saxony [70]. However, GSL remains an annex, a bonus in teacher training. As additional qualification it is open to all student teachers but remains optional: At Leuphana University Lüneburg, e.g., offers a GSL-certificate covers ten credit points [70]. That these modules are still not obligatory is attributable to an ongoing process of institutionalisation of GSL-modules in teacher education and whether GSL will unfold its full potential within the multilingual turn [58] remains to be seen.

7 Conclusion

After graduating from teacher education programmes, teachers vary in their competencies but have to meet the same demands when conducting lessons. With our data we were able to point to some aspects relating to these differences in an increasingly heterogeneous linguistic environment at vocational schools. The demand for GSL in educating vocational literacy in text-based lessons has risen, too. However, the university programmes in teacher education do not completely meet this demand. This is reflected in our data by the low number of active teachers with GSL (n = 17).

With regard to linguistic-related contents we were partly right to assume that teachers with GSL reflect their practices of supporting the writing processes of their students differently and apply their methods more actively and more varied. With our survey we were able to prove that there is a small and mostly descriptive difference between teachers with GSL and without GSL. While statistical significance was rarely achieved, descriptive trends consistently point to differences between the two groups. The difference becomes obvious in language-related episodes in the feedback-stage of the writing process. Due to the nature of our data we are not able to offer more insight explanations. We were able to show, however, that having studied GSL makes a difference in the teaching practice such as writing. Adding to the differences in allocating relevance to linguistic-related knowledge for general teacher [72] we are able to show a novel aspect to the question of how teaching varies according to GSL-contents, and indicate also improvement for teaching practices in vocational school teachers.

We were also able to point to various aspects for further research for applying GSL and intensified teacher education. GSL modules are a good point to start with because they have been established in teacher training, especially at university, and they are well-researched. Enhancing GSL-modules is a good start to raise awareness for the fact that all teaching is a matter of using once's complete set of linguistic resources. Additionally their enhancement could contribute to creating a language sensitive opportunity for learning [77] as well as improving teacher training and teaching all together.

Even though sometimes only a very slim part of the university course is dedicated to GSL contents, one can value the opportunity of the study time, that is the stance the course designers at Hamburg University take euphemistically (*The Chancen eines Punkts*) [69]. However, one must come to conclude that under the given circumstances the time budget is small, the range of content must be smallish and that the number of trainee teachers who graduate from university holding a qualification in GSL-related contents is very low, too. GSL modules were the first step toward the representation of multilingualism in teacher training. They also represent an important step toward addressing linguistic heterogeneity, their narrow scope, however, raises concerns about their effectiveness in addressing the multilingual realities of vocational education. Many programs fail to incorporate essential elements of multilingual pedagogies, such as utilizing students' home languages and cultural resources in vocational contexts [62, 88]. Aligning these modules with international best practices, including Canada's robust multilingual education frameworks, could significantly enhance their effectiveness and better prepare teachers to meet the challenges of modern, linguistically diverse vocational classrooms [57] and perform the multilingual turn in teacher professionalisation [58, 59].

However, the transfer of GSL-related contents from university to school meets restrictions within the school. Being rooted in a text-based society [89–91] school practices aim at educating the written language. In general teachers acknowledge the importance of feedback. Based on our results we focused on feedback in the writing process. Oracy, however, comes to our minds, too: the oral language, production and feedbacks offer a broad spectrum of opportunities for teaching the individual in competences in languages [91]. The research on feedback in second language learning and teaching offers a solid body of literature for further research into transfer opportunities into teacher training for GSL. The potential of both for teacher training, GSL and writing alike, has not yet been fully unfolded. Overall, the study implies the necessity of a more prolific focus on linguistically responsive writing in second language teacher training programs, i.e. by providing more opportunities to engage in discussions of materials and course work and for collaborative work settings in teacher training [86].

The necessity to fully unfold their potential becomes very clear when considering what is at stake in vocational training: connecting the areas of expertise (in GSL and writing) that have been unconnected up until now in order to form a robust foundation for domain- and job-specific and language-sensitive language use in teaching and learning.

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Author contributions CW and AB planned, structured, wrote, and revised the article. CW collected, analyzed and interpreted the data. AN supervised the process and helped to revise the article.

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Data availability The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate This study involving human participants was reviewed and approved by the *Regionales Landesamt für Schule und Bildung Braunschweig* (Regional Education Authority for Schools and Education, Braunschweig). The study was conducted in accordance with all relevant institutional and national ethical guidelines and regulations. All participants were informed about the aims, procedures, and potential risks of the study. Participation was voluntary, and all participants provided written, informed consent prior to beginning the online survey.

Consent for publication Written informed consent to publish anonymized data was obtained from all participants. All participants gave their informed written consent to participate in this study and to the publication of anonymized findings derived from the data.

Competing interests The authors declare no competing interests.

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