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From attitudes to self-efficacy: identifying teachers profiles to understand their differentiated instructional practice

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ABSTRACT

There is numerous empirical evidence that indicates the predictive role of teachers' self-efficacy and attitudes towards inclusive education for their inclusive teaching practice. However, despite extensive international research, there is still a very limited number of studies that have investigated the interplay amongst such variables and their resulting impact on inclusive practice. Considering the relevance of teachers' self-efficacy and attitudes for their inclusive teaching practice, the present study aims to explore their potential interrelations by employing latent profile analysis. Additionally, this study examines whether teachers differentiated instructional practice varies between the resulting teacher profiles. To address these research goals, the present study uses teacher data stemming from the National Educational Panel Study in Germany. The sample consisted of $N = 891$ in-service teachers from different school tracks. Three distinct latent profiles of teacher attitude were identified. Furthermore, these profiles predicted teachers' differentiated instructional practice. Limitations and further lines of research are further discussed.

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Inclusive education; differentiated instruction; self-efficacy; attitudes; in-service teachers

Introduction

With the global call towards the establishment of inclusive schools, research is needed to understand what influences the successful implementation of inclusive education (IE) practice. Within the context of IE research, a strong focus has been placed on teachers (Pozas, Letzel, and Schneider 2020), particularly on their self-efficacy and attitudes towards IE. Both variables have been of immense interest as they are considered crucial factors which could impact teachers' the implementation of IE (Wächter et al. 2024). The large body of research on such variables have shown that positive attitudes and higher self-efficacy determine teachers' use of inclusive practices (see e.g. Christopher, Joanna, and Kelly-Ann 2020; Schwab,

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Sharma, and Hoffmann 2022; Yada, Tolvanen, and Savolainen 2018). Additionally, within this line of research, further studies have also focused on examining the associations between attitudes and self-efficacy towards IE (e.g. Savolainen et al. 2012; Yada and Savolainen 2017). For instance, a recent meta-analysis (Yada et al. 2022) reported a significant positive relationship between teachers' self-efficacy and attitudes towards IE. However, despite the current amount of existing research, there is still little evidence on the interaction between teachers' self-efficacy and attitudes towards IE (Mudhar, Ertesvåg, and Pakarinen 2024) and their resulting impact on their implementation of inclusive practices (Yada et al. 2022), such as differentiated instruction (Schwab, Sharma, and Hoffmann 2022). Given the importance of teachers' self-efficacy and attitudes towards IE, not only for teachers' inclusive practice (Knauder and Corinna Koschmieder 2019) but also to support students' successful learning (Finkelstein, Sharma, and Furlonger 2021), it appears meaningful and necessary to explore the patterns and interrelations between such variables. With this background, the present study examines the interplay between teachers' self-efficacy and attitudes towards IE by performing latent profile analysis and further investigates the potential differences on their self-reported differentiated instructional practice.

Differentiated instruction

Differentiated instruction (DI) is an inclusive pedagogical approach that recognises and addresses student diversity, aiming to optimise student learning by strategically adapting the learning environment and tasks to align with individual students' learning needs (Valiandes and Neophytou 2018). Thus, DI can be postulated as an inclusive practice that responds to the strengths and weaknesses of all students (Dumont 2019). DI, as conceptualised within this study, is defined as intentional, systematically planned and reflected practices that enable teachers to meet the needs of all learners in heterogeneous classrooms (Graham et al., 2021). Thus, DI acknowledges and embraces student diversity by focusing on providing different learning opportunities according to students' readiness, interests and learning profiles. As a result, DI not only supports student learning, but also fosters their well-being (OECD 2023). DI can be implemented by teachers through multiple didactical strategies which range from the use tiered assignments to the implementation of tutoring systems, grouping formats and/or forms of open education like station-based work (Pozas and Schneider 2019). High-quality differentiation requires for teachers to continuously monitor students' academic progress (Suprayogi, Valcke, and Godwin 2017), and consequently, make a range of data-based decisions to help improve the success of students (Karst et al. 2022) as well as other teacher behaviours such as classroom management, positive classroom climate and clarity of instruction (Maulana et al. 2020). Beyond its recognition as a promising inclusive instructional approach (Valiandes and Neophytou 2018), DI is also theorised as a critical dimension of teaching quality (van Geel et al. 2019). Empirical findings from a recent comparative study by Maulana et al. (2020) substantiate that DI can be operationally defined as a specific domain of teaching quality across diverse educational contexts, including the Netherlands and South Korea.

Teachers' self-efficacy and attitudes towards IE

Previous research has indicated that teachers' self-efficacy and attitudes are two key teacher-level variables strongly related to teachers' IE practice (Knauder and Corinna Koschmieder 2019). Consequently, both variables serve as the guiding theoretical framework for the present study. Woolfolk (2004) defined self-efficacy as a person's own belief in their ability to successfully manage a specific situation. Following this line of thought, teachers' self-efficacy can be thus considered as an educator's beliefs regarding their teaching capabilities and persistence (Bandura 2017; Tschannen-Moran, Woolfolk Hoy, and Hoy 1998). In this line, teacher self-efficacy is considered as the beliefs related to teachers' goals, persistence, and resilience in their teaching profession (Tschannen-Moran, Woolfolk Hoy, and Hoy 1998). It should be noted that, according to Yada et al. (2022) meta-analysis, teachers' self-efficacy towards IE is a construct that incorporates both domain-specificity as well as generalisability. Klassen and Tze's (2014) systematic analysis reported a strong correlation between teachers' self-efficacy and their instructional behaviour. Similarly, empirical evidence from IE studies have demonstrated a significant positive correlation between teachers' self-efficacy and their implementation of DI (De Neve, Devos, and Tuytens 2015; Dixon et al. 2014; Letzel, Pozas, and Schneider 2020; Suprayogi, Valcke, and Godwin 2017). Furthermore, a study by Woodcock et al. (2022) revealed that teachers with higher self-efficacy towards IE tend to design and implement instructional practices that challenge all students.

In addition to teachers' self-efficacy, it is crucial to examine other variables that contribute to the supportive framework of Inclusive Education (IE). Attitudes, as conceptualised by Haddock and Gregory (2014), represent an individual's personal perspective towards a specific entity and are intrinsically linked to their behaviours. This theoretical underpinning is derived from Ajzen's (1991) social-psychological framework of planned behaviour. The Theory of Planned Behaviour has been employed as an analytical lens to investigate the relationships among teachers' attitudes, their intentions, and the implementation of inclusive teaching practices (Hellmich, Löper, and Görel 2019). Extensive international research grounded in this theoretical framework has demonstrated that teachers who possess more favourable attitudes are more likely to adopt inclusive pedagogical approaches (Hellmich, Löper, and Görel 2019; Schwab and Alnahdi 2020; Schwab, Sharma, and Hoffmann 2022). For example, Schwab et al. (2019) found that teachers with more positive attitudes are more likely to differentiate their instruction. This finding was further supported by Letzel, Pozas, and Schneider (2020), who noted that even after accounting for teachers' self-efficacy, attitudes remained the primary predictors of their DI practices.

Relationship between self-efficacy, attitudes and DI

As stated before, teachers' self-efficacy and attitudes towards IE have been intensively investigated. Most studies have shown, that in general, teachers' hold neutral to slightly positive self-efficacy and attitudes towards IE (Alnahdi and Schwab 2021; Mudhar, Ertesvåg, and Pakarinen, 2024; Wilson, Woolfson, and Durkun, 2022). In this vein, various recent studies (Gülsün et al. 2023; Yada and Savolainen 2017), meta-analyses (Yada et al. 2022) and systematic literature reviews (Wray, Sharma, and

Subban 2022) have determined a strong relationship between teachers' self-efficacy and attitudes. Although evidence on the direction of the relationship is still limited, the available research suggests that teachers' self-efficacy precede their attitudes towards IE (Letzel 2021; Savolainen, Malinen, and Schwab 2022). The meta-analysis from Yada et al. (2022) does confirm that the association between teachers' self-efficacy and attitudes towards IE is 'quite universal, regardless of time, culture, grade level taught, or gender, even though the magnitude of teachers' attitudes and self-efficacy might differ based on the factors' (p. 10). Bearing this in mind, it is expected that teachers potentially hold different levels of self-efficacy and attitudes towards IE, inherently affecting their inclusive instructional practice (Woodcock et al. 2022. However, most of such studies have explored either the patterns of teachers' levels of self-efficacy (see Kiel et al. 2020; Perera, Calkins, and Part 2019) or attitudes (see Letzel, Pozas, and Schneider 2020) separately and not in combination. To the best of our knowledge, only a study by Mudhar, Ertesvåg, and Pakarinen (2024) has explored patterns of both teachers' self-efficacy and attitudes towards IE. Results from their study revealed four distinct teacher profiles based on the interplay of varying levels of self-efficacy and attitudes. However, important to highlight is that this study did not explore whether such teacher profiles differ in the implementation of their inclusive practice, unlike in the present study. Moreover, the study from Mudhar et al. (2024) had a relatively small sample ($n = 100$), and thus, it would appear relevant as to test the robustness of those findings across other national (representative) samples.

Research aims

To create inclusive learning environments, teachers require not only adequate knowledge and skills to implement DI (OECD 2023), but also positive attitudes and SE (Yada et al. 2022). Considering the theoretical background, empirical evidence, and limitations discussed in the previous sections, the present study aims to explore the interrelations between teachers' self-efficacy and attitudes towards IE, as well as their potential impact on self-reported DI practice. In this vein, the study's research questions are the following:

(1) What are distinct profiles/subgroups of teacher's self-efficacy and attitudes towards inclusive education?
(2) Do these teacher profiles significantly differ in their self-reported DI implementation?

Method

Data context

To explore the research questions of the present study, representative quantitative data stemming from the National Educational Panel Study (NEPS) in Germany has been analysed. Specifically, data from the Starting Cohort 5, First-Year Students – From Higher Education to the Labour Market, was used (Blossfeld and von Maurice 2019; NEPS-Netzwerk 2024). Within the Cohort 5, the NEPS established an oversample of teacher education students, teacher trainees, and in-service teachers, which voluntarily

participated in a series of computer-assisted web interviews (FDZ-LIfBi 2021). The data collection for the Starting Cohort 5 started in 2010/2011, and as of today, 19 waves of data are available.

Participants

For the research purpose of the study, in-service teacher data from wave 17, collected in the winter of 2020 and beginning of 2021, was used. The total sample consisted of 891 in-service teachers with a mean age of 32.37 years (79% female). The sample was stratified according to school tracks within the German school system: primary school ($n = 22\%$), lower secondary school ($n = 15\%$), advanced secondary school ($n = 40\%$), and special education school ($n = 10\%$). Teachers with missing data were excluded from the study.

Instruments

Teachers' self-efficacy and attitudes towards IE

In the NEPS, teachers' self-efficacy and attitudes towards IE are measured using an adapted and shortened version of Bosse and Spörer's (2014) KIESEL instrument (German acronym for: *Kurzskalen zur inklusiven Einstellung und Selbstwirksamkeit von Lehrpersonen*) which consists of three subscales. In detail, the first subscale refers to teachers' self-efficacy for designing inclusive lessons and consists of four items (e.g. '*I am sure that even with the greatest differences in performance, I can provide appropriate learning opportunities for every child and teenager*', $\alpha = .86$). For the case of teachers' attitudes towards IE, two subscales were implemented: attitudes towards the design of inclusive lessons (3 items, e.g. '*Joint teaching of children and young people with and without disabilities can meet the needs of all children and young people by appropriate methods*', $\alpha = .79$) and attitudes towards the effects of inclusive teaching (3 items, e.g. '*The inclusion of students with disabilities in regular classes can be profitable for students without disabilities*', $\alpha = .67$). All three subscales consist of a 6-point Likert scale (1 = *completely disagree* to 6 = *completely agree*).

Teachers' self-reported DI use

Teachers' self-reported use of DI was assessed using an adapted version of the scale 'Differentiation' from the COACTIV Study (Teachers' Professional Competence, Activating Teaching and Development of Mathematical Competence - *Professionelle Kompetenz von Lehrkräften, kognitiv aktivierender Unterricht und die Entwicklung mathematischer Kompetenz*) by Baumert et al. (2008). The scale is composed of six items (e.g. '*I give students homework of varying difficulty depending on their performance level*', $\alpha = .85$) ranging from 1 = *never* to 6 = *very often*.

Data analysis

Data analyses were performed using IBM SPSS Statistics 27, Mplus (Version 8.6), and R (Version 4.4.2), with the R packages *haven* (Wickham, Miller, and Smith 2023), *lavaan* (Rosseel 2012), and *MplusAutomation* (Hallquist and Wiley 2018). Firstly, descriptive analyses, one-sample *t*-tests, and a confirmatory factor analysis (CFA) were computed

and interpreted according to typical guidelines (Hu and Bentler 1999). In the next step, Latent Profile Analyses (LPA) were freely estimated, and the optimal number of profiles was identified and interpreted based on recommended statistical criteria (Nylund, Asparouhov, and Muthén 2007). More precisely, the best-fitting model was selected based on log-likelihood criteria, Entropy, an elbow plot, the Lo-Mendell-Rubin likelihood ratio test (LMR-LRT), and Vuong-Lo-Mendell-Rubin likelihood ratio test (VLMR-LRT). Log likelihood criteria included Akaike's Information Criterion (AIC), Consistent AIC (CAIC), Bayesian Information Criterion (BIC), and adjusted Bayesian Information Criterion (ABIC) with lower values suggesting better model fit. For Entropy, higher values are argued to indicate higher class accuracy. Significant LMR-LRT and VLMR test results indicate an improved model fit compared to the model with one fewer profile. The profiles were additionally interpreted in respect of the theoretical literature. Lastly, we investigated how teacher profiles differ in practice of DI by applying the BCH approach (Asparouhov and Muthén 2014).

Results

Descriptive results

Table 1 shows the means and standard deviation of all measured variables. One sample *t*-test for dependent samples revealed that teachers' ratings on their attitudes towards designing inclusive lessons ($t[890] = 2.73$, $p < .01$, *Cohen's d* = 1.06), attitudes towards the effects of inclusive teaching ($t[890] = 15.97$, $p < .001$, *Cohen's d* = .87), self-efficacy towards designing inclusive lessons ($t[890] = 6.68$, $p < .001$, *Cohen's d* = .96) and DI ($t[887] = 10.28$, $p < .001$, *Cohen's d* = .97) were all significantly higher than their theoretical mean (3). However, it is necessary to bear in mind the scaling of the subscales. For the case of the subscales of attitudes and self-efficacy, the theoretical mean of 3.5 refers to a response of neutrality. In this context, the results suggest that teachers' attitudes and self-efficacy are neutral. Similarly, for the case of teachers' DI implementation, it is important to note that the theoretical mean of 3.5 indicates a label between 'rarely' and 'sometimes'. Consequently, this result should be critically reflected and considered with caution. Even though the analysis indicates a high value, given its scaling, it does not necessary refer to a more frequent DI practice but rather a quite seldom one.

Latent profile analysis

In the first step, a three-factor CFA was tested and could be confirmed with $\chi 2 = 249.815$, $p < .01$, Comparative Fit Index (CFI) = .93, Standardized Root-Mean-Square Residual

Table 1. Means and standard deviations.

Variable	*M*	*SD*	*1*	*2*	*3*	*4*
1. Self-efficacy: designing inclusive lessons	3.71	.96	-			
2. Attitudes: designing inclusive lessons	3.60	1.06	−.37**	-		
3. Attitudes: effects of inclusive teaching	3.96	.87	.30**	−.63**	-	
4. Teachers' (self-reported) DI practice	3.83	.97	.54**	−.22**	.09**	-

Table 2. Model fit for latent profile analysis of teachers' self-efficacy and attitudes.

Profiles	Free parameters	Log-likelihood	AIC	BIC	aBIC	LMR-LRT	VLMR-LRT	Entropy	Proportions of profile
2	13	−3612.88	7251.765	7314.066	7272.78	<.001	<.001	.629	600–291
3	**20**	**−3492.96**	**7025.915**	**7121.762**	**7058.245**	**<.001**	**<.001**	**.767**	**165–157–569**
4	27	−3467.14	6988.282	7117.675	7031.928	.21	.21	.671	69–343–264–215
5	34	−3439.31	6946.611	7109.551	7001.573	.14	.13	.688	35–62–250–275–269
6	41	−3428.72	6939.43	7135.916	7005.708	.25	.25	.681	71–254–228–53–255–30

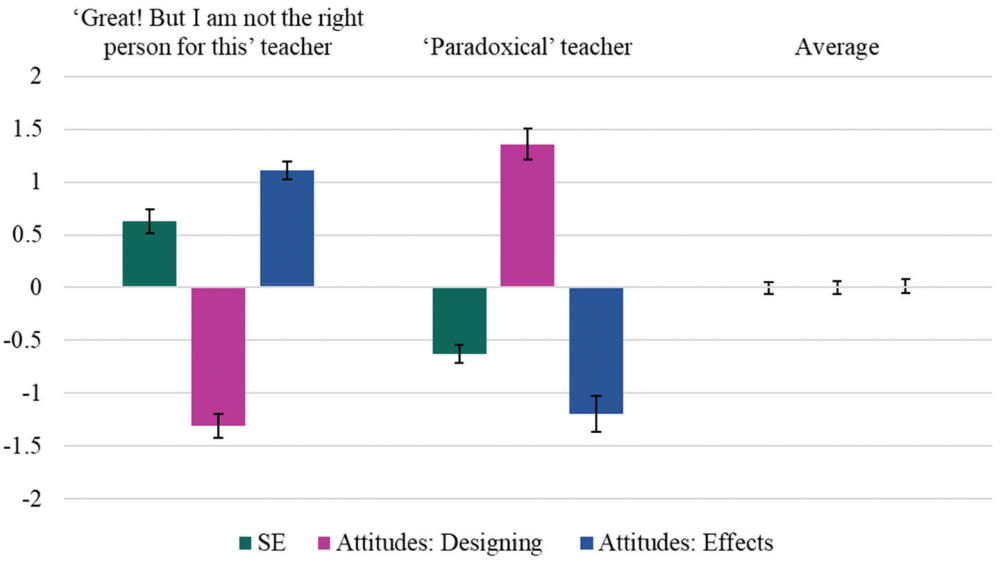

Figure 1. Latent profiles of teachers' self-efficacy and attitudes.

(SRMR) = .05, Root Mean Square Error of Approximation (RMSEA) = .1, and 90% CI for the RMSEA = [.09, .11].

Afterwards, the first research question was investigated through the estimation of six latent profile models in ascending order. Table 2 depicts the fit indices used for model comparison. Considering the results of the LMR-LRT, VLMR-LRT, entropy, and the elbow plot, the three-profile model demonstrated the best overall fit. Based on the interpretation of these fit indices, the three-profile model was selected (Figure 1).

Profile descriptions

The following section presents a description of each profile whilst Figure 1 presents a visual representation of each profile.

- Profile 1, the '*Great! But I am not the right person for this*' teacher: Teachers in this profile are characterised by the lowest scores for self-efficacy towards designing inclusive lessons and attitude towards the effects of inclusive teaching. However, they reported the highest score for their attitudes relating to the designing of inclusive lessons. Interestingly, these teachers have the highest score for the attitude concerning the designing of inclusive lessons compared to the other two profiles. Hence, it can be deduced that although these teachers feel strongly positive towards the design and adoption of inclusive learning environments, they do not consider themselves relatively able to address students' individual learning needs nor fully convinced on the effects of IE.
- Profile 2, the '*Neutral/Average*' teacher: Teachers in Profile 2 are characterized by overall (equally) average scores in all three subscales. Thus, it can be assumed that teachers within this profile perceive themselves as only moderately capable to

design an inclusive lesson which is tailored to the learners' diverse needs. Additionally, they tend to feel neutral towards or undecided towards the feasibility, quality and effectiveness of inclusive.

- Profile 3, the '*Paradoxical*' teacher: A particular distinct characteristic from teachers in this profile is that they are the exact opposite from their counterparts in Profile 1. Hence, teachers in the third profile are characterized by the highest scores for both self-efficacy towards designing inclusive lessons and attitude towards the effects of inclusive teaching. In contrast, they hold the lowest score for their attitudes towards the design of inclusive lessons. Overall, it can be assumed that such teachers feel very well capable of implementing inclusive practices and believe that it will support students' learning, but they are not necessarily convinced on the feasibility of IE.

Differences between teacher profiles and their DI implementation

To address research question two, DI was included as an outcome variable in the final LPA model. As presented in Table 3, Profile 1 demonstrated significantly higher mean levels of DI practice compared to Profile 2 ($\chi2 = 23.07$, $p < .01$, $d = 0.22$) and Profile 3 ($\chi2 = 23.66$, $p < .01$, $d = 0.25$). Based on relevant guidelines (Funder and Ozer 2019), the observed mean differences represent medium effect sizes. However, no significant differences in DI practice were found between Profiles 2 and 3 ($\chi2 = 1.21$, $p = .27$).

Discussion

This study sought to examine the interplay between teachers' self-efficacy, attitudes and implementation of inclusive practices. The results show that three distinct clusters could be extracted from the data. Profile 1 holds rather low self-efficacy values and does not perceive inclusive practices as effective. However, teachers in this cluster see the value of IE in general. Therefore, it is not surprising, that this cluster tends to implement inclusive practices rather seldomly. This result shows first that low self-efficacy values as well as negative attitudes seem to be related with a low frequency of implementation of inclusive practices. Taking this into consideration, the results support former studies (e.g. Letzel 2021; Letzel, Pozas, and Schneider 2023) that already pointed at the relation between self-efficacy, attitudes and the implementation of DI. However, this result also shows that attitudes cannot be assumed as one-dimensional variable, but rather a multi-dimensional concept that has. This result underpins studies from Letzel, Pozas, and Schneider (2023) and Savolainen et al. (2020) that also identified attitudes rather a multi-dimensional construct than a bipolar continuum. Additionally, the fact that teachers indeed can hold positive attitude facets concerning IE but do not consider them able to design inclusive lessons, nor see positive effects of inclusive practices, indicate that there is indeed a discrepancy between considering IE meaningful in general and not being able to

Table 3. Relationships between profile membership and outcome.

Outcome	Profile 1 M [CI]	Profile 2 M [CI]	Profile 3 M [CI]	Significant differences between profiles
DI	4.26 [4.17, 4.35]	3.63 [3.53, 3.73]	3.75 [3.71, 3.79]	P2 = P3 < P1

transfer this into practice (Hertel et al. 2010; Schiepe-Tiska et al. 2013; Smit and Humpert 2012).

Profile 2 shows that neutral values self-efficacy as well as neutral attitudes towards the designing of inclusive lessons and towards the effect of inclusive teaching, result in a relatively low rate of DI implementation, just as Profile 1 does. This shows that just holding some positive attitudes towards the designing of inclusive lessons (or in general towards IE itself) does not automatically result in providing inclusive practices.

Profile 3 shows that teachers that hold high values of self-efficacy and attitudes towards the effects of inclusive teaching do indeed implement DI rather frequently. However, surprisingly, they hold rather negative attitudes concerning the designing of inclusive lessons. They do not consider that lessons can be designed in such a way that, both students with and without special educational needs can profit. This result is striking, as teachers within this cluster do believe in the effect inclusive teaching has and are generally able to provide inclusive teaching. Those teachers do not hold positive attitudes towards inclusive teaching on general; however, as they seem to not have another choice, they provide inclusive learning opportunities for all of their students. Taking into consideration such interesting interplay, further in-depth research into the facets of attitudes is advisable to examine the detailed structure of attitudes and its predictive power concerning inclusive teaching.

Limitations

The present study holds several limitations that need to be considered when interpreting the results. First, this study uses self-reports; thus such data always includes the risk of teacher's providing answers according to social desirability (Winkler, Kroh, and Spiess 2006). Moreover, the NEPS uses an adapted version of the KIESEL instrument, and consequently only certain subscales are included. Other subscales such as teachers' attitudes towards students' challenging behaviour in inclusive classrooms, self-efficacy for dealing with class interruptions as well as their collaboration with parents are not considered. As a result, when exploring teacher profiles with the complete original scale could possibly draw a different and more detailed picture of teachers' self-efficacy and attitudes towards inclusion. Additionally, the KIESEL instrument focuses specifically in collecting data regarding teachers' attitudes and self-efficacy towards IE and not DI, which inherently might impact the relationship between the variables. Important to highlight as well is that the NEPS instrument measuring teachers' DI implementation solely focuses on the use of tiered assignments, rather than the manifold of available DI practices (Pozas, Letzel, and Schneider 2020). Hence, the results within this study must be interpreted with caution.

Another limitation to consider is the sample itself, as it mainly characterised by female teachers (79%) and teachers within advanced secondary schools (40%). Nevertheless, it is important to highlight that the NEPS uses a representative sample, which inherently represent the German teaching force (Stephan, Markus, and Gläser-Zikuda 2019). Moreover, given the purpose of the study, other key variables such as teaching experience, learning opportunities, and the school track in which the teachers are working in, were not considered in the study. Further research should include such variables when considering the interplay of teachers' attitudes, self-efficacy, and DI.

Lastly, it is important to consider that the teacher data was collected during the Coronavirus pandemic. Thus, the school-related closures and resulting challenges for teachers could have an impact on the results. Consequently, the teacher profiles as well as their resulting differences concerning their DI practice should be interpreted with caution. With this context, it is then strongly suggested that further research explores the present study's results using longitudinal data to identify whether there is an impact on the development of teachers' self-efficacy and attitudes.

Conclusion

The findings from the present study enhance the empirical understanding of teachers' self-efficacy and attitudes towards IE. It provides insights into the very different interplay of the variables of self-efficacy and the diverse attitudes dimensions, strengthening the argument that attitudes should not be considered as only positive or negative. Considering the long empirical documentation on the critical significance of self-efficacy and attitudes for an effective inclusive teaching practice, the results from this study contribute as well to inform teacher education and teachers' professional training. It is necessary for pre- and in-service teachers to have experiences to explore, examine and test diverse practice that show them not only the effects of IE but mastery experiences that allow them to develop confidence in their inclusive practice.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Data availability statement

This paper uses data from the National Educational Panel Study (NEPS; see Blossfeld & Roßbach, 2019). The NEPS is carried out by the Leibniz Institute for Educational Trajectories (LIfBi, Germany) in cooperation with a nationwide network.

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