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Confident, positive, but interested? Exploring the role of teachers' interest in their practice of differentiated instruction

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Given the substantial ongoing increase of individual learning demands, teachers are urged to address student heterogeneity in their daily teaching practice by means of differentiated instruction (DI). As the successful and effective implementation of DI relies mainly on teachers, research has intensively focused on examining teacher-related variables, such as teachers' self-efficacy and attitudes, that have played a crucial role in their use of differentiated instructional practices. However, besides these well researched constructs, teacher interest is another important teacher-related variable that has, up to now, received very little attention and has been rarely incorporated into inclusive education research. Against this background, this study aimed to bring together previous research on teacher-related variables on their differentiated instructional practice, and extend prior literature by incorporate teachers' interests. In total, 168 German in-service teachers from different school tracks participated in the study. Results from hierarchical linear regression (HLR) analyses showed a significant and positive predicting role of teacher interests on their practice of DI. Noteworthy is that teacher interests contributed significantly to their differentiated instructional practice, even after controlling for their self-efficacy and attitudes. Implications of the results, as well as further lines of research are discussed.

KEYWORDS

teacher interest, self-efficacy, attitudes, inclusive education, differentiated instruction (DI)

Introduction

More than ever before, classrooms around the world are filled with a highly diverse student population. Even though policymakers have been making efforts to deal with student diversity by organizing school systems into streams or tracks (Dupriez et al., 2008), teachers still report that the heterogeneity of the student population is continuously increasing (Dixon et al., 2014). Student heterogeneity is by no means limited to differences in performance and academic readiness. It also refers to aspects such as language competence, gender-based learning preferences, cultural background, learning styles, motivation, interest, and other features (Dijkstra et al., 2016; Maulana et al., 2020). With this substantial ongoing increase of individual learning demands, the need for teachers to successfully address student heterogeneity in their daily teaching practice has only become more crucial. Against this background, policymakers and researchers urge teachers to embrace diversity and are called to move away from the one-size-fits-all teaching approach and into the practice of differentiated instruction (DI) (United Nations Educational, Scientific and Cultural Organization, 2017). DI aims to meet students' individual learning needs by maximizing learning opportunities (Gheysens et al., 2020; Maulana et al., 2020). Given that DI has its starting point on students' learning demands (Smale-Jacobse et al., 2019), it has been identified as an inclusive educational approach that seeks to ensure equity as well as educational justice (Valiandes and Neophytou, 2018; Lindner and Schwab, 2020) and has been widely recognized as a core element of effective teaching (Organization for Economic Co-operation and Development, 2012).

However, even though DI has been identified as a promising inclusive approach (Roy et al., 2013), and educators acknowledge the need to differentiate their instruction in order to address students' various learning needs (Hertberg-Davis and Brighton, 2006; Valiandes and Neophytou, 2018), teachers' implementation of DI in their daily instructional practice remains critical (Suprayogi et al., 2017). Numerous studies have revealed that teachers worldwide struggle to differentiate their instruction and rarely adapt their teaching according to their students' characteristics (De Neve et al., 2015; Schleicher, 2016; van Geel et al., 2019). These studies have reported that teachers either feel unprepared by their teacher training to effectively use DI (Idol, 2006; Pozas and Letzel, 2019), have a lack of understanding of DI (Whipple, 2012; Valiandes and Neophytou, 2018), are not motivated to differentiate their instruction (Chan et al., 2002) or simply have insufficient resources and time to plan for it. As a consequence, teachers end up selecting single practices on an arbitrary basis without critical reflection of its practical implication. Additionally, studies report that teachers hold a low variance in their use of DI practices (Lindner et al., 2019). It appears that teachers tend to

differentiate their instruction by means of tiered assignments (i.e., providing more time for students to answer an activity) as it requires a lower effort compared to adapting content and processes (Smit and Humpert, 2012; Roy et al., 2013; Gaitas and Alves Martins, 2017; Pozas et al., 2019; Nusser and Gehrler, 2020).

Given that teachers are a determining factor when it comes to the implementation of DI, research has intensively examined the associations between teacher-related variables that have an impact in their instructional behavior, such as the use of inclusive teaching practices (e.g., Savolainen et al., 2012; Miesera et al., 2018; Hellmich et al., 2019). This line of research follows the hypothesis that positive attitudes and higher self-efficacy predict teachers' use of inclusive practices such as DI (Schwab et al., 2019). Nonetheless, besides teachers' attitudes and self-efficacy, teacher interest is another important teacher-related variable that has, up to now, received very little attention and has been rarely incorporated into inclusive education research (Reichhart, 2018). In the past, literature and research on the construct of interest has focused primarily on student interest, and far less work has been invested in developing theoretical models of teachers' interest (Watt and Richardson, 2008; Schiefele et al., 2013). This has resulted in a lack of research toward an examination of the nature and structure of teacher interest as well as development of valid measurement instruments (Hulleman, 2010). It has only been until recently that educational researchers have placed great attention and focus on establishing a theoretical framework to explore teachers' interest (see Schiefele et al., 2013). Based on results from the few previous studies, it has been discussed that teacher interest plays a significant role on how teachers structure their lessons, plan and implement their instructional practices, as well as fosters teachers' feelings of competence (Schiefele et al., 2013; Reichhart, 2018). With this background, the present study has two aims: on the one hand it brings together teacher-related variables that have been previously shown to be of particular importance for teachers' inclusive instructional behavior, which are teachers' self-efficacy and attitudes (Knauder and Koschmieder, 2019). On the other hand, this study seeks to extend prior research by focusing on the potential effects of teacher interest on their DI practice.

Differentiated instruction

Differentiated instruction is an inclusive teaching approach that acknowledges student diversity and aims to maximize student learning by carefully aligning the learning environment and tasks according to the individual learning needs of students (Loreman, 2017; Valiandes and Neophytou, 2018). DI can therefore be assumed to function as an inclusive practice that responds to all students' strengths

and weaknesses (Dumont, 2019; Pozas and Schneider, 2019). In order to meet the learning needs of all students, teachers should modify the content, processes, and products in correspondence to their students' readiness, interests, and learning profiles. Teachers could implement DI through a variety of instructional behaviors such as the use of tiered assignments, homogeneous or heterogeneous subgroups based on students' performance, readiness or interests (Coubergs et al., 2017; Hachfeld and Lazarides, 2020; Maulana et al., 2020). Tomlinson (2017) also suggests the use of tutoring systems, staggered non-verbal material such as helping cards, and open education practices, such as station-based work, project-based learning, or portfolios. Additionally, research has also pointed out at variants of mastery learning strategies such as jigsaw puzzles, enrichments or prioritized curricula directed at high and low achieving students as effective DI practices (Lawrence-Brown, 2004; Darnon et al., 2012). Finally, in order to effectively implement DI, teachers should continuously monitor their students' academic process (Tomlinson, 2017; Dack, 2019) and should be paired up with other teacher behaviors such as classroom management, positive classroom climate, and clarity of instruction (Maulana et al., 2020).

Teachers' DI practice has been found to have positive effects on students' outcomes (Loreman, 2017; Maulana et al., 2020). Studies by Reis et al. (2011), Goddard et al. (2015), and Bal (2016) reported positive and significant effects of teachers' use of DI on students' mathematics and reading achievement. Likewise, DI have also been reported to foster students' learning interest, motivation and self-confidence (McQuarrie and McRae, 2010; Eysink et al., 2017). Besides being considered a promising inclusive instructional approach (Valiandes and Neophytou, 2018), DI is also conceptualized as an important domain of teaching quality (van Geel et al., 2019). Results from a recent comparative study by Maulana et al. (2020) indicated that DI can be empirically considered as a specific domain of teaching quality in distinct countries like Netherlands and South Korea.

Teacher-related variables and differentiated instruction

Teacher interest

Interest is considered as one of the most important constructs within motivation theories (Hidi, 2006; Schiefele, 2009; Linnenbrink-Garcia and Patall, 2016). As a result, the interest construct has received considerable attention in both literature and research. However, previous studies have mainly focused on student interest (Retelsdorf et al., 2010; Daumiller, 2018). Consequently, the construct of interest has gained far less attention within the teacher motivation field, and

therefore, only a few theories on the structure of teacher interest have been developed (Reichhart, 2018). One of the leading conceptualizations of teacher interest was established by Schiefele et al. (2013), which stems from the person-object theory of interest (Hidi et al., 2004). Schiefele et al. (2013) conceptualized teacher interest as a multidimensional construct divided into three domains: subject, didactic, and educational interest. Teachers' subject interest refers to the interest in the subject matter taught (e.g., biology), as well as the curricular content and the aspects of the broader subject acquired during teacher education (Eren, 2012). By didactic interest, Schiefele et al. (2013) refer to teachers' interest in instructional methods or approaches, which can be resulting from a preference or strong value on effective teaching methods. Finally, teachers' educational interest is related to the interest in the pedagogical aspect of the teaching profession that cover for example the appropriate management of a difficult class situation, fostering values, or handling problematic students (Schiefele et al., 2013; Schiefele, 2017). In line with Terhart (2000), the three domains of teacher interest are in correspondence to a teacher's main task domains, which are teaching and educating. Additionally, this multidimensional conceptualization breakdown is similar to Shulman's (1986) model of teacher's three main categories of relevant professional knowledge (Schiefele et al., 2013).

Although teacher interest is considered an important construct that relates to teachers' behaviors (Schiefele et al., 2013), so far, there are only a few studies that have investigated this relationship (Eren, 2012). For instance, Schiefele and Schaffner (2015) found that teacher educational and didactic interest predict their use of mastery-oriented practices and cognitive stimulation. Moreover, Schiefele et al. (2013) reported that didactic interest was found to be a significant predictor of DI. Of particular importance is that this significant contribution was made even after statistically controlling for self-efficacy. In this line, it appears that teachers that perceive themselves as more self-efficacious and hold a strong didactic interest, make more frequent use of DI practice. To summarize, despite the fact that only a few studies have investigated the relationship of teacher interest and their instructional practice, results suggest a significant positive association (Eren, 2012). Therefore, it seems relevant and promising to include teacher interest in further research (Daumiller, 2018), in particular when it comes to teachers' inclusive instructional practices such as DI.

Self-efficacy and attitudes

When discussing teacher-related variables that are linked to teachers' inclusive instructional practice, two crucial factors must be taken into consideration: self-efficacy and attitudes (Knauder and Koschmieder, 2019). Self-efficacy has been

defined as an individual's belief in his or her own ability to manage a situation (Woolfolk, 2004). In this line, teacher self-efficacy is considered as the beliefs related to teachers' goals, persistence, and resilience in their teaching profession (Tschannen-Moran et al., 1998). The influence of self-efficacy on teachers' DI practice, has been intensively researched. Studies by Suprayogi et al. (2017) as well as Dixon et al. (2014) have shown a significant positive link between teachers' self-efficacy and the use of DI. Furthermore, research by De Neve et al. (2015) indicated that self-efficacy is a predictor of beginning teachers' DI implementation. It appears that novice teachers who believe in their ability to address student heterogeneity aim to differentiated their instruction and persist in seeking for the most appropriate DI strategy for struggling students.

On the other hand, previous research has also discussed the important role of teacher attitudes on their inclusive instructional practice (Hellmich et al., 2019; Schwab et al., 2019; Savolainen et al., 2020). According to Haddock and Maio (2014), attitudes are an expression of an individual's own viewpoint of a certain attitude-object and are strongly related to a person's actions. Hence, it is assumed that attitudes play a vital role in teachers' in-class instruction and are therefore considered an essential factor of teachers' professional behavior (Baumert and Kunter, 2006). Although teachers' positive attitudes are presumed to predict teachers' inclusive instructional practice, there is still little research that has provided empirical evidence to this assumption (Schwab et al., 2019). However, some recent studies have focused on exploring deeper this hypothesis. Analyses from a study by Schwab et al. (2019) revealed that teachers holding more positive attitudes tend to differentiated their instruction. This was also shown in a more recent study by Letzel et al. (2020). Interesting is that Letzel et al. (2020) point out, that even after controlling for teachers' self-efficacy, teachers' attitudes appeared to be the dominant predictors of their DI practice.

The present study

Given that teachers are a determining factor for the successful and effective implementation of DI, research has intensively focused on exploring the role of various teacher-related variables for the use of DI practices. In light of the aforementioned theoretical background and outcomes of previous studies, it seems meaningful to integrate teacher interest into research concerning teacher-related variables that foster DI practice. Therefore, the present study aims, on the one hand, to bring together teacher-related constructs that have been previously shown to be of particular importance for teachers' implementation of DI practices, such as teachers' self-efficacy and attitudes (De Neve et al., 2015; Kopmann and Zeinz, 2016; Suprayogi et al., 2017; Schwab, 2018; Schwab et al., 2018;

Knauder and Koschmieder, 2019). And in the other, to extend prior research on teacher-related variables by examining the less explored variable of teacher interest and its predicting role in the use of DI. The research questions guiding this study were:

- RQ1: How do teachers assess their own teacher interest, attitudes toward DI, and teacher self-efficacy?

H1: Considering past research, it is expected that teachers assess themselves to have slightly positive subject, didactic and educational interest (Schiefele et al., 2013), hold neutral or mildly positive attitudes (Savolainen et al., 2020), have a somewhat positive self-efficacy (Schwab and Alnahdi, 2020), and implement moderately DI (Letzel et al., 2020).

- RQ2: What is the relationship between the teacher-related variables of teacher interest, attitudes toward DI, and teacher self-efficacy?

H2: It is hypothesized that didactic interest, self-efficacy, and value of DI will be significantly correlated with their DI implementation, whereas the attitudinal domain of lack of resources will be negatively correlated with DI implementation (Schiefele et al., 2013; Knauder and Koschmieder, 2019; Schwab et al., 2019; Letzel et al., 2020; Savolainen et al., 2020).

- RQ3: Does teacher interest predict teachers' DI practice even after controlling for their self-efficacy and attitudes?

H3: It is expected that the more didactic interest, the more self-efficacious and the more positive attitudes teachers hold, the more often they will report implementing DI. These effects of teachers' didactic interest are assumed to be observed even after controlling for teachers' self-efficacy and attitudes (Suprayogi et al., 2017; Knauder and Koschmieder, 2019; Letzel et al., 2020).

Materials and methods

Participants and procedure

To answer the research question, this study uses data from 168 teachers (41% female) who participated in an online survey conducted between May and June 2020. The sample was stratified according to the different school tracks within the German school system: advanced or academic track secondary school ($N = 114$), intermediate secondary schools ($N = 15$), comprehensive schools ($N = 17$), primary school ($N = 17$),

special school ($N = 4$) and other school forms (i.e., vocational education school) or missing ($N = 12$). The teachers were between 23 and 66 years old ($M = 39.09$, $MD = 36$; $SD = 10.08$) and had between 1 and 41 years of teaching experience ($M = 12.10$, $SD = 9.56$). Based on G*power calculations, the required sample size for Hierarchical Linear Regression with an estimated effect size of 0.15, a power of 0.95, and a total of 9 predictors is a total of 166 participants. Hence, the current sample size is in line with the established threshold (Faul et al., 2007).

Instruments

Teachers' self-reported use of differentiated instruction

Teachers' self-reported use of DI was measured using the differentiated instruction scale (DIS) from Roy et al. (2013). The DIS is composed of two sub-scales underlying the following constructs: *Instructional Adaptations* (10 items, i.e., "Plan different assignments to match students' abilities") ($\alpha = 0.90$) and *Academic Progress Monitoring* (four items, i.e., "Use students' data to make decisions about teaching adjustments") ($\alpha = 0.82$). Both sub-scales are based on a 5-point Likert scale ranging from 1 = *never* to 5 = *very often*.

Teacher interest

Teacher's interest was measured using the Teacher Interest Scale from Schiefele et al. (2013). The scale is composed of three sub-scales underlying the following constructs: *Subject interest* (five items, i.e., "I chose my subject because I find it interesting") ($\alpha = 0.91$), *Didactic interest* (four items, i.e., "I place a strong personal value on thinking about teaching methods") ($\alpha = 0.87$), and *Educational interest* (four items, i.e., "The most interesting aspect of my work is helping students develop a people") ($\alpha = 0.84$). All sub-scales are based on a 4-point Likert scale ranging from 1 = *not at all true* to 4 = *very true*.

Teachers' self-efficacy

Teachers' self-efficacy was measured using the Teachers Self-Efficacy Scale from Schwarzer et al. (1999). The scale consists of 10 items (i.e., "I am convinced that I am able to successfully teach all relevant subject content to even the most difficult students") and comprises a 4-point Likert scale ranging from 1 = *not at all true* to 4 = *exactly true* ($\alpha = 0.87$).

Teachers' attitudes toward differentiated instruction

Teachers' attitudes toward DI was measured using the Teachers' Attitudes toward DI Scale (TAT-DIS) from Letzel et al. (2020). The TAT-DIS consists of two sub-scales underlying the following constructs: *Value of DI* (five items, i.e., "Differentiated instruction is necessary to address all students") ($\alpha = 0.90$)

and *Perceived Insufficient Resources* (three items, i.e., "If I had more time, I would differentiate my instruction more often") ($\alpha = 0.83$). Both sub-scales are based on a 5-point Likert scale ranging from 1 = *strongly disagree* to 5 = *strongly agree*.

Data analysis

Statistical analyses were conducted in IBM SPSS Statistics 27. In order to explore the first two research questions, descriptive analyses, one-sample *t*-tests and correlations were performed. To examine the third research question, that is, the role of teachers' self-efficacy, attitudes toward DI, and interest in predicting teachers' implementation of instructional adaptations and academic progress monitoring, two four stage hierarchical linear regression (HLR) analyses with listwise exclusion of cases with missing data were performed. The first model focused teachers' use of instructional adaptations, whereas the second model aimed on exploring teachers' academic progress monitoring. Before the HLR analyses were performed, the independent variables were examined for collinearity. According to the inspected variance inflation factor (VIF) values (collinearity statistics) in all HLR models, multicollinearity was found to be low (<2). Autocorrelation was revised using the Durbin-Watson statistic which indicated acceptable levels ranging from 2.15 to 2.24 across all HLR models (Savin and White, 1978).

Results

Teachers' assessment of their interest, attitudes toward differentiated instruction and self-efficacy

Descriptive statistics and correlations are presented in Table 1. In relation to teachers' self-reported instructional adaptations and academic progress monitoring, descriptive results indicated that teachers rated their use of instructional adaptations and academic progress monitoring were above average (based on a scale of 1–5). One-sample *t*-tests confirm that the mean scores for both sub-scales were significantly above the theoretical mean of 3, $t(151) = 3.40$, $p < 0.01$ (instructional adaptations), and $t(151) = 3.30$, $p < 0.01$ (academic progress monitoring).

Additionally, in line with the hypotheses, one-sample *t*-tests revealed that although teacher report having a significantly higher value of DI [$t(158) = 7.55$, $p < 0.001$], they also indicated higher mean scores of perceived insufficient resources [$t(158) = 13.96$, $p < 0.001$]. With regards to teachers' self-efficacy and interests, participants reported rather higher mean scores for self-efficacy [$t(156) = 6.37$, $p < 0.001$], subject interest [$t(168) = 13.95$, $p < 0.001$],

TABLE 1 Means, standard deviations, and correlations of all variables.

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11
1. Instructional adaptations	3.28	1.02	—										
2. Academic progress monitoring	3.27	1.02	0.79**	—									
3. Teacher self-efficacy	2.8	0.59	0.65**	0.63**	—								
4. Value of DI	3.64	1.07	0.59**	0.61**	0.50**	—							
5. Perceived insufficient resources	4.12	1.01	0.20*	0.29**	0.50**	0.40**	—						
6. Subject interest	3.32	0.77	0.32**	0.32**	0.53**	0.37**	0.45**	—					
7. Didactic interest	2.86	0.77	0.55**	0.48**	0.49**	0.56**	0.36**	0.53**	—				
8. Educational interest	2.82	0.76	0.44**	0.47**	0.44**	0.35**	0.31**	0.29**	0.47**	—			
9. Gender	—	—	0.15	0.15	0.11	0.01	−0.17*	−0.06	−0.04	0.11	—		
10. Age	39.09	10.08	0.18	−0.09	−0.11	−0.19*	−0.04	−0.01	−0.00	−0.01	−0.12	—	
11. Teaching experience	12.1	9.56	−0.11	−0.01	−0.02	−0.15	−0.001	−0.03	0.05	−0.03	−0.1	0.93**	—

TABLE 2 Multiple regression models: prediction of teachers' implementation of instructional adaptations.

Variable	Model 1	Model 2	Model 3	Model 4
	β	β	β	β
Gender	0.12	0.11	0.30	−0.02
Age	−0.25	−0.11	0.12	0.12
Teacher experience	0.12	−0.01	−0.23	−0.20
Subject interest		−0.02	−0.16	−0.08
Didactic interest		0.46**	0.41**	0.30**
Educational interest		0.14 ⁺	0.08	0.09
Teacher self-efficacy			0.43**	0.43**
Value of DI				0.25**
Perceived insufficient resources				−0.28**
<i>R</i> ²	0.04	0.31	0.44	0.55
ΔR^2	0.04	0.27**	0.13**	0.11**

⁺*p* < 0.10; ***p* < 0.01.

TABLE 3 Multiple regression models: prediction of teachers' academic progress monitoring.

Variable	Model 1	Model 2	Model 3	Model 4
	β	β	β	β
Gender	0.13	0.10	0.03	0.00
Age	−0.27	−0.14	0.08	0.07
Teacher experience	0.25	0.13	−0.09	−0.04
Subject interest		0.00	−0.14 ⁺	−0.10
Didactic interest		0.39**	0.33**	0.18*
Educational interest		0.21*	0.16*	0.15*
Teacher self-efficacy			0.42**	0.41**
Value of DI				0.30**
Perceived insufficient resources				−0.14*
<i>R</i> ²	0.03	0.28	0.41	0.49
ΔR^2	0.03	0.26**	0.13**	0.08**

⁺*p* < 0.10; **p* < 0.05; ***p* < 0.01.

didactic interest [$t(168) = 6.08, p < 0.001$] and educational interest [$t(168) = 5.44, p < 0.001$]. Finally, *t*-tests assessing differences in gender for all variables under study did not yield significant results.

Correlations between teachers' interest, attitudes toward differentiated instruction and self-efficacy

Pearson correlations were calculated for each variable in the study and presented within Table 1. As hypothesized, strong and significant correlations were found between teachers' self-reported use of instructional adaptations, teachers' self-efficacy, value of DI, didactic, and educational interest. A similar pattern of correlations was also found for teachers' implementation of academic progress monitoring.

Predicting teachers' differentiated instruction practice by teacher interest

The first HLR analysis included the instructional adaptations subscale as the dependent variable, whereas the second HLR analysis considered the academic progress monitoring as the dependent variable. For both HLR analyses, model 1 included gender, age, and teaching experiences as covariates, while model 2 introduced subject, didactic and educational interest as predictors. Model 3 added the sole predictor of teachers' self-efficacy, and finally, model 4 included value of DI and perceived insufficient resources into the regression equation. As seen from Table 2, the HLR analyses revealed that in model 1, taking gender, age, and teacher experience as covariates into the regression equation explained only an insignificant 4% of the variation in the use of instructional adaptations. Introducing subject, didactic, and

educational interest into the model explained an additional 27% of variation in teachers' instructional adaptations use, increasing the model's R^2 significantly [$F(6,134) = 9.68, p < 0.001$]. When introducing teachers' self-efficacy (model 3), the variable accounted significantly for 13% of the variation [$F(7,134) = 14.37, p < 0.001$]. Finally, when value of DI and perceived insufficient resources were also controlled for (model 4), all variables accounted for 55% of the variance in teachers' instructional adaptations [$F(9,134) = 16.72, p < 0.001$]. The results indicate that teachers who have higher levels of didactic interest, perceive themselves as more self-efficacious, hold higher levels of value of DI, and perceive lower levels of insufficient resources tend to implement more often instructional adaptations.

When observing [Table 3](#), the HLR analyses revealed that in model 1, taking gender, age, and teacher experience as covariates into the regression equation explained only an insignificant 3% of the variation in the use of academic progress monitoring. Introducing subject, didactic, and educational interest into the model explained an additional 26% of variation in teachers' academic progress monitoring, increasing the model's R^2 significantly [$F(6,134) = 8.37, p < 0.001$]. When introducing teachers' self-efficacy (model 3), the variable accounted significantly for 13% of the variation [$F(7,134) = 12.61, p < 0.001$]. Finally, when value of DI and perceived insufficient resources were also controlled for (model 4), all variables accounted for 49% of the variance in teachers' academic progress monitoring [$F(9,134) = 13.12, p < 0.001$]. In detail, the results reveal that teachers who have higher levels of didactic and educational interest, perceive themselves to be more self-efficacious, hold higher levels of value of DI and perceive lower levels of insufficient resources tend to perform more frequent academic progress monitoring.

Discussion

The present study aimed to extend previous research concerning the relationship between teacher-related variables on their DI practice by incorporating teacher interest as a potential significant predictor. More specifically, this research examined the contributions of teachers' interest, self-efficacy, and attitudes toward teachers' reported use of DI. The study's descriptive results indicated that teachers' self-reported use of instructional adaptations and academic progress monitoring seems to be above average. Recent studies by [Lindner et al. \(2019\)](#) and [Letzel et al. \(2020\)](#) revealed that teachers implement DI regularly. Thus, the results obtained in this study seem to be in line with past research. However, although the results suggest that teachers do indeed make use of DI, their practice is clearly not highly frequently. With this background, the results might point out to the fact that DI

does not appear to be embedded in teachers' daily inclusive instructional portfolio.

Additionally, the correlation analyses showed positive associations between teachers' self-efficacy, attitudes toward DI, teacher interests, and DI practice. These results show that the variables have a complex relationship among each other. Clearly, the findings obtained from the positive significant correlations between teachers' self-efficacy and attitudes are in line with previous literature (e.g., [Savolainen et al., 2012](#)). Nonetheless, further theoretical and empirical analyses should be carried out to thoroughly and carefully examine the associations among all the variables under study in this research.

Concerning the HLR analyses, results first, provide empirical evidence that both self-efficacy as well as teachers' positive attitudes are important predictors of teachers' DI implementation. Previous studies have repeatedly discussed the lack of support to the hypothesis that positive attitudes and self-efficacy significantly influence teachers' DI practice ([Schwab et al., 2019](#); [Schwab and Alnahdi, 2020](#)). In line with recent research by [Letzel et al. \(2020\)](#), this study's results provide empirical underpinning on the relationship between these variables. However, in comparison to [Letzel et al.'s \(2020\)](#) results, the present study's results revealed that teachers' self-efficacy, instead of attitudes, was found to be the strongest predictor for both teachers' instructional adaptations and academic progress monitoring. Comparing the present results about this influence of teachers' self-efficacy and attitudes toward their implementation of DI with the results of previous studies (e.g., [Savolainen et al., 2012](#)), they appear to be similar. However, more recent studies have yielded contrasting results (e.g., [Letzel et al., 2020](#)). Given this mixed evidence, the interpretation of the results should be made with care. Against this backdrop, it is necessary to highlight that this study followed a cross-sectional design, and thus, future studies should strive to follow longitudinal or cross-lagged panel designs that can provide insights into causality ([Schwab and Alnahdi, 2020](#)).

Second, in line with the single study that explored the predicting role of teacher interest on DI ([Schiefele et al., 2013](#)), the findings from this study demonstrate that didactic interest is significantly associated with teachers' self-reported implementation of instructional adaptations. A noteworthy result is the fact that teachers' didactic interest contributes significantly, even after controlling for teachers' self-efficacy and attitudes. In particular, for the case of the subscale of instructional adaptations, the results indicate that teachers' didactic interest functions as the second strongest predictor in the final model. Taken together, it can be concluded that the more self-efficacious teachers considered themselves to be, the more value they prescribe to DI, the less insufficient resources they perceive and the stronger their interest is in didactical issues, the more they reported to differentiate their instruction.

On the other hand, teachers' academic progress monitoring was significantly predicted by teachers' educational and didactic interest, as well as teachers' self-efficacy and attitudes. For the specific case of the subscale of academic progress monitoring, didactic, and educational interest were only found to be the third and fourth strongest predictors. The particular contribution of educational interest to academic progress monitoring may be explained by the fact that teachers with higher educational interest tend to help students to improve academically and therefore seek to have a continuous monitor students' progress (Schiefele et al., 2013). Taken together, the results from the HLR analyses confirm the present study's assumptions that teacher interests contribute significantly to the involved criterion measures even after controlling for teacher self-efficacy and attitudes.

Lastly, it is important to discuss that subject interest was not revealed to be a significant predictor of either teachers' instructional adaptations or academic progress monitoring. This result was also noted in the study by Schiefele et al. (2013). The authors argue that didactic and educational interest seem to facilitate the practice of DI as both constructs are key roles when it comes to the preference or choice for more effective instructional practices; whereas subject interest is associated with positive emotional states during the teaching experience.

Limitations and further research

Although data was collected from teachers across different school tracks, the sample is predominantly based on advanced secondary school teachers. Consequently, the results should be interpreted with caution. Findings from the study by Schiefele et al. (2013) revealed significant differences between the three interest domains and school tracks. Therefore, it is strongly suggested that further research seeks to collect sufficient data from each school track in order to explore the differences across school tracks and potential effects on the use of DI. A second limitation is that the present study uses teachers' self-reports of DI. Thus, such responses can inherently be sensitive to overestimation, underestimation, or socially desired answers. Desimone et al. (2010), however, found that teachers' self-reports regarding their teaching practices are highly correlated to classroom observations. An important recommendation for future research is to use not only self-reports but also classroom observations.

A third limitation is that this study holds a cross-sectional design. As a consequence, it is impossible to derive any assumptions about the direction of the effects found in this study. Hence, it is strongly suggested that further research follows longitudinal designs that can help corroborate the casual direction of the relationships between the variables studied in this investigation. Moreover, recent results from

Savolainen et al. (2020) have revealed that teachers' self-efficacy is a predictor of attitudes toward inclusive education. In this context, the relationships between the variables of teachers' self-efficacy, attitudes as well as interest should be carefully and thoroughly explored.

Implications and conclusion

This study holds both theoretical and practical implications. From the theoretical perspective, the findings from this work contribute empirical evidence to the ongoing research on the relationship between teachers' self-efficacy and attitudes toward inclusive education and their use of inclusive practices. Moreover, it also attempts to be an initial step to extend prior research by providing insights into how teachers' interests contribute to their inclusive instructional practice, such as DI. From a practical perspective, this research recognizes the importance of didactic and educational interest for in-service teachers as it motivates teachers to differentiate their instruction, leading to better selection of inclusive practices, and a continuous monitoring of student progress. On the other hand, the findings from this study has also implications for teacher education. Teacher training programs should strive to foster not only student teachers' self-efficacy and positive attitude, but also to focus more strongly on promoting didactic and educational interests.

To finalize, a relatively novel feature of this research was to bring together teacher-related constructs that are of highly importance for inclusive education, while extending prior literature by incorporating a rather understudied teacher interest construct. In this context, the present study wishes to encourage educational researchers to further explore the construct of teacher interest within inclusive education, as it appears to play a distinctive role in teachers' DI implementation. Lastly, based on the findings within the study, it can be assumed that the domain of didactic and educational interest are also important variables that support teachers' inclusive practice, and thus call for in-service and pre-service training to support and foster such an important variable.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by Inspectorate and Service Directorate (Aufsichts- und Dienstleistungsdirektion) of the state of

Rhineland-Palatinate. The patients/participants provided their written informed consent to participate in this study.

Author contributions

MP conceived the original idea and supported NB and JR in planning the research project. NB and JR carried out the data collection process and prepared the dataset. MP took the lead in writing the manuscript with the support from VL who contributed to the interpretation of the results and shaped manuscript. All authors provided critical feedback to the final version of the manuscript.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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