



## Research paper

The effects of differentiated instruction on teachers' stress and job satisfaction<sup>☆</sup>Marcela Pozas<sup>a, b, \*</sup>, Verena Letzel-Alt<sup>c</sup>, Susanne Schwab<sup>d</sup><sup>a</sup> Professional School of Education, Humboldt-Universität zu Berlin, Berlin, Germany<sup>b</sup> School of Psychology, University of Monterrey, Mexico<sup>c</sup> Section for Teacher Education and Research, University of Trier, Germany<sup>d</sup> Center for Teacher Education, University of Vienna, Research Focus Area Optentia, North-West University in Vanderbijlpark, South Africa

## ARTICLE INFO

## Article history:

Received 9 May 2020

Received in revised form

15 November 2022

Accepted 21 November 2022

Available online 29 November 2022

## Keywords:

heterogeneity

Student diversity

Differentiated instruction

Teachers' stress

Teachers' job satisfaction

## ABSTRACT

Following an embedded sequential explanatory mixed-method research design in which quantitative and qualitative data were merged, this paper examines teachers' experiences of stress and job satisfaction and their relation to the DI practice. The quantitative study uses data from the National Educational Panel Study in Germany ( $N = 209$  teachers), while the qualitative study analyses interview responses of 24 secondary school teachers. Findings reveal that teachers experience positive effects from implementing DI, but also perceive the practice as slightly stressful. Additionally, the paper discusses teachers' DI training needs and the implications of the results, and calls for further research.

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## 1. Introduction

In their classroom, teachers around the world are confronted with a highly diverse student population that differs not only in performance and academic readiness, but also in their learning preferences, cultural backgrounds, language competence, learning styles, and motivation, as well as social, methodological, and self-regulatory competencies (Hardy et al., 2019; Jokinen et al., 2012). In order to maximize each student's learning potential, policy-makers, and researchers urge teachers to embrace student diversity and adapt their instruction to the diverse learning needs of the students in their classrooms (e.g., Unesco, 2017).

One pedagogical approach that acknowledges the differences among learners and aims to respond effectively to students' varying learning needs is "differentiated instruction" (DI). DI is an approach by which teachers aim to provide optimal learning for all by carefully aligning learning tasks and activities with students' learning

needs (Roy et al., 2013; Tomlinson, 2014, 2017). Research has documented the positive effects of DI across the educational settings in which it has been implemented, reporting positive effects of DI on student achievement as well as learning interest and self-confidence (Eysink et al., 2017; Johnsen, 2003; Mc Quarrie & Mc Rae, 2010).

Although DI has been recognised as the key to academic success for all learners (Guay et al., 2017) and teachers acknowledge it to be a valuable, necessary, and highly significant instructional practice (Graham et al., 2016; Hertberg-Davis & Brighton, 2006), teachers worldwide struggle to differentiate their instruction and rarely adapt their teaching according to their students' characteristics (Dijkstra, Walraven, Mooij, & Kirschner, 2016; Schleicher, 2016; van Geel et al., 2019). Furthermore, studies have also reported that teachers hold a rather low variance in their use of DI practices between individual students (e.g., Pozas et al., 2019; Smit & Humpert, 2012). The main reasons as to why teachers do not frequently implement DI, too, have been explored in the past: studies have indicated that teachers feel unprepared to adopt DI (Idol, 2006) or have a lack of understanding of the same (Dee, 2010; Whipple, 2012). Other studies have drawn attention to teacher perceptions of the feasibility or difficulty of enabling DI. Results from Gaitas and Alves Martins (2017) revealed that teachers find it

<sup>☆</sup> This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

\* Corresponding author. Professional School of Education, Humboldt-Universität zu Berlin, Berlin, Germany.

E-mail address: [marcela.pozas.guajardo@hu-berlin.de](mailto:marcela.pozas.guajardo@hu-berlin.de) (M. Pozas).

most difficult to adapt activities and materials according to students' skills, abilities, and learning profiles, as well as to conduct formative and regular diagnostic assessments to support student achievement. However, despite the fact that DI has been regarded by teachers as a stressful and challenging professional job demand (Dijkstra et al., 2016; Deunk et al., 2015; Skaalvik & Skaalvik, 2017a; Stollman et al., 2019), previous literature has mostly focused on the benefits of DI for students and has paid less attention to the actual effects of teaching heterogeneous groups on the well-being of teachers themselves (Reiter, 1996; Skaalvik & Skaalvik, 2015; Talmor et al., 2005; Ulich et al., 2002).

Against this background, the aim of this paper was to conduct an embedded sequential mixed-methods research design to obtain insights into the effects of implementing DI on teachers (Creswell, 2009). Specifically, this research focuses on investigating experiences that could relate to their stress and job satisfaction resulting from the practice of DI. Focus is placed on these two elements, as they have been identified as critical sources influencing teachers' performance and effectiveness (Collie et al., 2012; Judge et al., 2001; Kim et al., 2019; Klassen & Chiu, 2010), which subsume a full range of positive and negative work experiences.

## 2. Differentiated instruction

DI can be defined as the intentional, systematically planned and reflected practices that enable teachers to meet the needs of all learners within heterogeneous classrooms (Graham, Bruin, Lassig, & Spandagou, 2021; Letzel et al., 2020) while continuously monitoring students' academic process (Dack, 2019; Suprayogi et al., 2017). In order to differentiate instruction, Tomlinson (2014, 2017) suggests teachers should modify the content, processes, and products in correspondence with their students' readiness, interests, and learning profiles. Teachers can implement DI through a variety of instructional activities or didactical strategies, such as homogeneous or heterogeneous subgroups based on learners' performance or interests, or tiered assignments (Coubergs et al., 2017; Hachfeld & Lazarides, 2021; Maulana et al., 2020). For instance, tiered assignments could be design-based, on a qualitative and/or quantitative variation of materials (e.g. provide extra assignments for high achievers), and tasks according to challenge level, complexity outcome, process, product, and/or resources (Pozas & Schneider, 2019; Letzel et al., 2020). Other possible DI practices are the use of tutoring systems, staggered nonverbal material learning aids such as checklists, and forms of open education like station-based work, interest-based centres, project-based learning, or portfolios (Hall, 2002; Tomlinson, 2014, 2017). Additionally, Lawrence-Brown (2004) suggested implementing variants of mastery learning strategies such as enrichments or prioritised curricula directed at both high and low achieving students. Even though each of these approaches is distinct in nature, some practices may only be effective when used in a meaningful combination. For instance, homogeneous within-class ability grouping calls for the modification of teaching methods or instructional materials, such as the implementation of tiered assignments (Lou et al., 1996, 2000). Kulik (1992) argued that homogeneous grouping requires teachers to adapt the learning materials and tasks to the learning needs and abilities of the students in each group. Hence, the DI practice of homogeneous grouping entails that teachers need to consider many factors, in particular individual learning needs, in order to assign students to the most appropriate group (Lou et al., 1996).

In a recent study, Van Geel et al. (2019) conducted a cognitive task analysis to explore the knowledge and skills teachers require to perform DI. Through their analyses, the authors have identified several factors that contribute to the complexity of executing DI.

Such factors are related to the content of the lesson, how the group is composed (i.e., student diversity), school support such as collaboration and materials, and both the availability and accessibility of student achievement data. Van Geel et al. (2019) argued such complexity factors are linked, and thus, commonly relate to one another when differentiating instruction. The authors state that DI does not translate only into the application of adaptive strategies, but rather into a reflected process where teachers have an accurate view of students' learning needs, have set a learning goal, and thus know which DI practice is appropriate for their students. In other words, previous research indicates that DI cannot be done "on the fly", but rather in a planned and purposefully reflected process.

## 3. Teachers' stress and job satisfaction

Some research has provided insights into the effects of certain complex teaching strategies on teacher stress and satisfaction (Ben-Ari et al., 2003). However, there is still a significant gap in research concerning the interrelation between dealing with heterogeneous classrooms by means of implementing DI and teachers' stress and satisfaction (Skaalvik & Skaalvik, 2015). This is particularly important because it provides information on how to better support teachers as well as how to design appropriate teacher training programmes in line with teacher needs, and the potential negative consequences of stress and lack of satisfaction on both their well-being and quality of education in general (Skaalvik & Skaalvik, 2015; 2017a).

Teachers worldwide face a heavy workload that is also accompanied by demands from school administrators, peers and colleagues, as well as students and their parents (Klassen & Chiu, 2010; OECD, 2014). Teacher stress is conceptualised as the experience of unpleasant and negative emotions resulting from their daily work (Collie et al., 2012; Kyriacou, 2001). A number of different stressors, related to a teachers' workload and classroom factors (Collie et al., 2012), have been previously reported in empirical literature. These include, for instance, discipline problems, time pressures and poor student motivation, amongst others (Ferguson, 2008; Collie et al., 2007; Skaalvik & Skaalvik, 2015; 2017a). According to Klassen and Chiu (2010), such potential stressors can contribute separately to overall teacher stress and are associated with lower levels of job satisfaction (Klassen & Chiu, 2010) and teacher effectiveness (Kokkinos, 2007).

Within quantitative research, however, teacher stress has "been defined and indicated differently by different researchers" (Skaalvik & Skaalvik, 2015, p. 1786). For the purpose of this study, and in line with Skaalvik and Skaalvik (2015), teacher stress is defined as the "experience of unpleasant emotions (emotional stress) resulting from aspects of the work as a teacher" (p. 1787). Particular focus is placed on the job demand of teaching a diverse student body and thus having to adapt instruction according to students' individual needs (Skaalvik & Skaalvik, 2015; 2017a). Results from a qualitative study by Skaalvik and Skaalvik (2015) revealed that most teachers perceive the responsibility of tailoring instruction as a major source of stress because they feel unable to meet this obligation. This stress arises from the fact that teachers have insufficient planning time to prepare appropriate instruction to address the needs of all students, and also feel unprepared to implement DI (Forlin, 2001; Moriarty et al., 2001; Skaalvik & Skaalvik, 2015).

Despite high levels of teacher stress, the teaching profession also brings satisfaction (e.g., Skaalvik & Skaalvik, 2015). Job satisfaction refers to the sense of fulfilment and achievement derived from the daily activities of an occupation (Collie et al., 2012; Klassen & Chiu, 2010). Job satisfaction is associated with higher levels of job

performance and has been considered a critical element that influences teachers' attitudes and motivation. Dinham and Scott (1998) classified the sources of teachers' job satisfaction and dissatisfaction as (a) intrinsic rewards of teaching, which relate to the work with students and seeing them learn and progress (Cockburn & Haydn, 2003), (b) external school factors, and (c) school-related factors, such as supportive school environments. A study conducted by Katz (2015) reported that teachers' willingness to implement inclusive practices had a positive effect on job satisfaction. In detail, analysis from interviews conducted in this study identified that teachers felt more satisfied and excited when working with inclusive practices. Additionally, Katz (2015) stated that teachers reported feeling more satisfied because they felt like they were making a difference.

Moreover, ample research has shown that stress is associated with lower job satisfaction (e.g. Collie et al., 2012; De Nobile & McCormick, 2006; Greenglass & Burke, 2003; Klassen & Chiu, 2010; Skaalvik & Skaalvik, 2015, 2017a). Greenglass and Burke (2003) argue that, while teachers with high levels of stress may gain satisfaction from their own teaching jobs, their levels of satisfaction could be affected by stress originating from different sources. For instance, studies have indicated that the stress originating from a heavy workload and lack of time for planning and preparing their courses lowers teachers' levels of satisfaction (Liu & Ramsey, 2008; Skaalvik & Skaalvik, 2015).

To fully understand teachers' experiences when differentiating instruction, research needs to examine several teacher (Forlin, 2001; Pozas & Schneider, 2019; Smit & Humpert, 2012) and context (Santamaria & Thousand, 2004) variables that are associated with the use of DI and that also tap into a number of aspects of teachers' stress and job satisfaction (see Klassen & Chiu, 2010). With regard to teacher characteristics, experience, gender and age have been related to teachers' stress and job satisfaction levels (Klassen & Chiu, 2010; Skaalvik & Skaalvik, 2015). For instance, gender differences in stress have been found, with female teachers reporting greater stress than male teachers (Greenglass & Burke, 2003). With regards to job satisfaction, some studies report that female teachers are however more satisfied in their teaching work than male teachers (De Nobile & McCormick, 2008; Liu & Ramsey, 2008). A recent study by Reilly, Dhingra, and Boduszek (2014) has provided evidence indicating a negative relationship between teacher experience and age with job satisfaction, as well as a positive association of teaching experience and age with teacher stress.

Concerning potential context variables, in a recent study, Glock et al. (2019) argued that the composition of the student body, such as classrooms comprised of students with highly diverse performance levels, could contribute to teacher stress. Their results revealed that teachers experienced higher levels of stress and burnout and lower levels of self-efficacy when confronted with a highly diverse student population. These results seem to be especially important, bearing in mind that highly diverse classes often require teachers to adapt their instruction in order to provide meaningful learning (Altricher et al., 2009; Dixon et al., 2014). Considering that teachers' use of DI varies significantly across school tracks, evidence for a clear picture is still lacking. Evidence from the Programme for International Student Assessment (2009) shows that comprehensive school teachers implement the greatest amount of DI practices in their daily teaching, followed by teachers of general secondary schools and schools with different courses of education (Hertel et al., 2010). In contrast, advanced secondary school teachers tend to make less use of DI practices (Pozas et al., 2019). However, regarding variations across stress and job satisfaction levels, certain studies indicate significant small variations between school tracks (Arold et al., 2000), whereas other papers report no significant variations (Klusmann et al., 2006).

#### 4. Research questions

The primary goal of this paper is to generate an analysis based on the in-depth exploration of the effects of DI on teachers' stress and job satisfaction. Therefore, quantitative and qualitative data were merged in an embedded sequential explanatory mixed-methods research design (Creswell, 2009). In this paper particularly, the use of this research design allowed for the conducting of a deeper examination in order to identify and understand the specific factors that are related to the complex practice of DI that inherently influence levels of teacher stress and job satisfaction.

The research question guiding the first phase of quantitative analyses was as follows:

1. Is there a relationship between teachers' implementation of DI practices and teachers' stress and job satisfaction levels?

Phase 2, the qualitative study, builds on the quantitative study and follows two further questions:

2. What are teachers' positive and negative experiences concerning the implementation of DI?
3. Do teachers' positive and negative experiences differ across school tracks?
4. How are these experiences related to teachers' stress and job satisfaction?

#### 5. Method

In this study, a two-phased approach was implemented. Phase 1 consisted of a quantitative study that used nationally representative data from Germany and aimed to analyse the relation between teachers' implementation of DI practices and their stress and job satisfaction. Phase 2 followed a qualitative approach, in which data extracted from interviews provided a better understanding of the specific factors behind teachers' implementation of DI that come into play and thus could be related to their stress and job satisfaction. Therefore, the present study is characterised as having a sequential exploratory mixed methods design. The primary focus is on the quantitative data collection, analysis, and interpretation; secondary emphasis is given to the explanatory qualitative inquiry (Creswell & Plano Clark, 2007).

#### 6. Study 1: quantitative study

##### 6.1. Sampling and sample

The analyses were conducted using data from the first point of measurement, which occurred in 2011, sourced from the National Educational Panel Study (NEPS) in Germany (Blossfeld & Maurice, 2011, NEPS Network, 2021). The NEPS used multistage sampling based on explicit and implicit stratification processes such as "stratified sampling generally leads to more precise estimates for the whole population" (Blossfeld et al., 2011, p. 56). Teacher data starting from cohort three has been used. The sample consisted of 209 language arts (77% female) teachers (subject German). Table 1 presents the sample's full demographic information.

##### 6.2. Instrumentation

###### 6.2.1. Teachers' stress in lessons

Teachers' stress in lessons was measured with the item: "In what areas do you experience stress during class and during the preparation of classes? I experience stress due to the different

**Table 1**  
Sample general demographic information.

Demographic characteristics		Percentage
Age	Younger than 34	21%
	34–43 years	28%
	44–53 years	16%
	54–63 years	30%
	Older than 63 years	5%
Gender	Male	23%
	Female	77%
School track	General secondary schools	21%
	Schools with general and intermediate secondary school programmes	12%
	Intermediate secondary schools	20%
	Comprehensive schools	9%
	Advanced secondary schools	38%
Total		209

learning abilities of the students.“. This item was based on a 5-point scale ranging from 1 = *not stressful at all*, 2 = *rather not stressful*, 3 = *partly*, 4 = *rather stressful*, and 5 = *very stressful*.

### 6.2.2. Job satisfaction

To assess teachers’ job satisfaction, NEPS employed nine items (i.e., “To what extent do the following statements apply to you? I can hardly cope with the tension of the teaching profession.”) based on a 4-point scale ranging from 1 = *does not apply at all*, 2 = *rather does not apply*, 3 = *does rather apply*, and 4 = *applies completely*). For the present sample, the reliability of the scale is acceptable as ( $\alpha = 0.85$ ).

### 6.2.3. DI practices

The NEPS subject-specific (German) teacher questionnaire included single items that correspond to how (and at what frequency) teachers conduct, plan, and organise their lessons. The single items corresponding to teachers DI practices were as follows:

1. “To what extent do the following statements apply to your German lessons in this class?” The DI items were measured on a 5-point scale ranging from 1 = *does not apply*, 2 = *does rather not apply*, 3 = *partly applies*, 4 = *does rather apply* and 5 = *applies completely*.

**Tiered Assignments.** “I allow students who work faster to move on to the next assignment while I am still practicing or reviewing things.” (Slow/fast students)

**Tiered Assignments.** “If students have difficulties in understanding, I give them additional assignments.” (Additional assignments)

**Tiered Assignments.** “I give more capable students extra assignments that are really challenging for them.” (Extra assignments)

**Intentional Composition of Student Working Groups.** “I form groups of students with similar capabilities.” (Homogeneous ability grouping)

**Intentional Composition of Student Working Groups.** “I form groups of students with different capabilities.” (Heterogeneous ability grouping)

2. “How often do you use the following social types of learning in this German class?” These DI items were assessed on a 6-point scale ranging from 1 = *never*, 2 = *once or twice per school year*, 3 = *every few months*, 4 = *every two to four weeks*, 5 = *once a week* and 6 = *(almost) every lesson*.

**Tutoring Systems Within the Learning Group.** “Student acting

as tutors (‘Learning by Teaching’, peer tutoring).” (Tutoring)

**Open Education or Granting Autonomy to Students.** “Project-based learning: The students work in groups on a certain topic and then present the results of their work.” (Project-based learning)

### 6.3. Data analyses

Prior to data analysis, the items “slow/fast students”, “additional assignments” and “extra assignments” were used to build a mean score labelled “tiered assignments”. Additionally, the DI items “tutoring systems” and “project-based learning” were originally assessed with a 6-point Likert scale. Therefore, following the suggestions of Harwell and Gatti (2001), calculating an arithmetic transformation where both items were transformed into a 5-point Likert scale in order to align them with the other DI practices’ items was conducted.

In order to explore the first research question, a multivariate analysis of covariance (MANCOVA) was conducted. With regard to assumption considerations, (a) multivariate normality was revised by conducting Q–Q plots (Garson, 2012), which indicated that the dependent variables had a multivariate normality within the groups, and (b) the assumption of homogeneity of covariance matrices was checked by using Box M test (Field, 2013). Given that the Box test was not significant and assumption of multivariate normality was plausible, Pillai’s trace obtained from the analyses was reported (Field, 2013). Notably, tests of sphericity were not conducted as MANCOVA does not require the fulfilment of this assumption (Field, 2013). The DI practices of tiered assignments, homogeneous ability grouping, heterogeneous ability grouping, tutoring systems and project-based learning were submitted to the MANCOVA as dependent variables, while school tracks and gender were included as independent variables.

## 7. Results

### 7.1. Descriptive results

Table 2 shows the mean scores and correlations of all variables. In general, the empirical scale mean was slightly above the theoretical average. Results of a univariate analysis of variance showed no significant differences between female and male teachers concerning their stress levels [ $F(1, 201) = 0.80, p = ns$ ]. Moreover, a univariate analysis of variance revealed no significant differences across school tracks [ $F(4, 201) = 1.36, p = ns$ ]. No significant differences between female and male teachers regarding their job satisfaction level was found [ $F(4, 201) = 0.04, p = ns$ ]. In contrast, results of a univariate analysis of variance indicated that teachers working in schools with general and intermediate secondary school

**Table 2**  
Means, standard deviations, and correlations among teachers' stress, job satisfaction, DI practices, and teacher collaboration.

	M	SD	1	2	3	4	5	6	7	8
1. Teachers' stress (students' different learning abilities)	3.34	.83	–							
2. Teachers' job satisfaction	3.14	.51	–.20 <sup>a</sup>	–						
3. Tiered assignments	3.44	.77	–.03	.03	–					
4. Homogeneous grouping	2.32	.90	.18 <sup>a</sup>	–.02	.16 <sup>a</sup>	–				
5. Heterogeneous grouping	3.67	.89	–.07	.02	.16 <sup>a</sup>	–.41**	–			
6. Tutoring systems	2.46	1.22	–.07	.09	.33**	.00	.20**	–		
7. Project-based learning	2.48	.75	–.09	.07	.24**	–.02	.16 <sup>a</sup>	.36**	–	
8. Gender <sup>a</sup>	–	–	–.05	–.04	.19	–.06	.04	.11	.15 <sup>a</sup>	–
9. General secondary school <sup>a</sup>	–	–	–.08	–.09	.20	.11	–.07	.17 <sup>a</sup>	.02	.11
10. School with general and intermediate secondary school programs <sup>a</sup>	–	–	.12	–.11	.05	.05	–.08	–.10	.08	.09
11. Intermediate secondary school <sup>a</sup>	–	–	.12	.12	.03	.11	.11	.06	.00	–.01
12. Comprehensive school <sup>a</sup>	–	–	–.08	–.03	.15 <sup>a</sup>	–.07	.06	.13	–.06	–.04
13. Advanced secondary school <sup>a</sup>	–	–	–.07	.06	–.32**	–.17 <sup>a</sup>	–.02	–.20**	–.04	–.16 <sup>a</sup>

<sup>a</sup> Dummy coded variable. Gender: 1 = male, 2 = female; each school track was dummy coded as 1, and 0 for other school track.

programmes experienced less job satisfaction in comparison to their counterparts in other school tracks [ $F(4, 201) = 2.98, p < .05, \eta^2 = 0.06$ ].

Taken together, it seems that teachers tend to using tiered assignments and building groups of students with different ability levels more often than other DI practices such as homogeneous ability groups, tutoring systems or project-based learning. In general, DI practices do not seem to be implemented strongly in everyday teaching practices.

7.1.1. Relationship between teachers' implementation of DI and their stress and job satisfaction levels

Using Pillai's trace, the multivariate analysis of variance revealed a significant main effect of school track,  $V = .22, F(4, 196) = 2.21, p < .01, \eta^2 = 0.05$ . The follow-up univariate analyses of each dependent variable revealed a significant main effect for the use of tiered assignments [ $F(4, 196) = 5.01, p < .01, \eta^2 = 0.10$ ] and homogeneous ability grouping [ $F(4, 196) = 2.93, p < .05, \eta^2 = 0.06$ ]. To elaborate, as seen in Fig. 1, advanced secondary school teachers as well as teachers in schools with general and intermediate secondary school programs implement the DI practice of tiered assignments less often in comparison to other school track teachers.

Additionally, Fig. 2 shows that both comprehensive school and advanced secondary school teachers adopt homogeneous ability grouping in their regular teaching practices less often.

Second, Pearson correlations were calculated for each variable in the study. As Table 1 indicates, weak and low positive correlations were found between teachers' stress due to the different learning abilities of the students and DI practice of homogeneous ability grouping. In addition, it was found that the more stress teachers experienced due to the different learning abilities, the lower their job satisfaction. However, for all other DI practices, no significant correlations with teacher stress due to differing student learning ability, DI practices, gender or school tracks were found. Likewise, no significant correlations between job satisfaction, DI practices, gender or school tracks were reported.

7.2. Discussion of study 1

Following a quantitative approach, Study 1 aimed at exploring and describing the associations between teachers' implementation of DI practices and their stress concerning students' different learning abilities and job satisfaction. Consistent with previous international research (Skaalvik & Skaalvik, 2015; 2017a; Shernoff

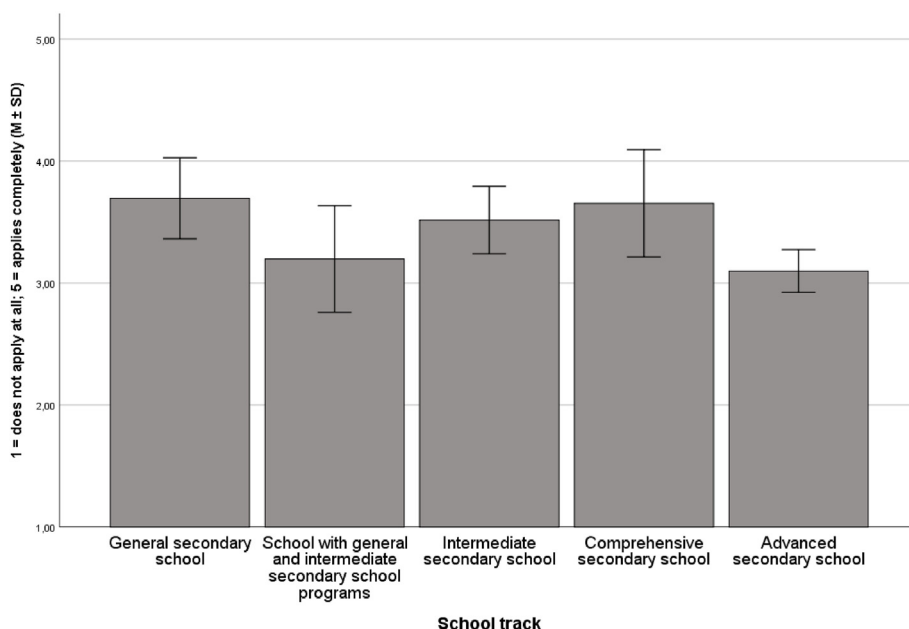


Fig. 1. Differences among school track concerning the DI practice of tiered assignments.

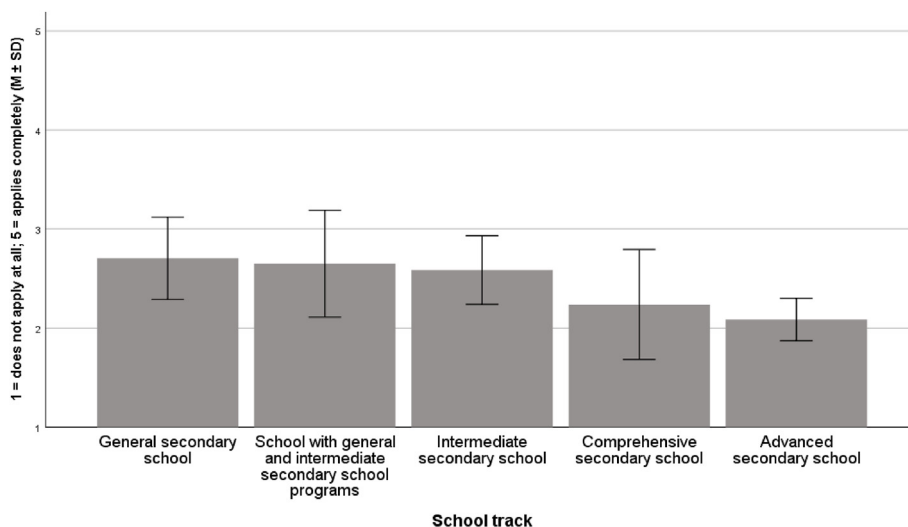


Fig. 2. Differences among school track concerning the DI practice of homogeneous ability grouping.

et al., 2011; Talmor et al., 2005), the mean values of teachers' ratings in this sample suggested that teachers perceive some stress due to the different learning abilities of the students. The repercussions of teacher stress are serious, e.g. when it comes to health and social consequences (Scheuch et al., 2015), but also in terms of poor student outcomes (Herman et al., 2018). Within this study, it was shown that teachers' stress related to student diversity is negatively (and significantly) related to teacher job satisfaction. This confirmed previous studies indicating that a higher stress level is linked with lower job satisfaction (Klassen & Chiu, 2010). Therefore, reducing teacher stress seems to be an important ongoing challenge. The relatively high standard deviation of teachers' stress levels linked with DI might indicate that some teachers are able to cope with the requirements of DI better than others. However, it might also signal that those who are not feeling stressed are those who are not using DI intensively. For future research, identifying factors which in turn identify especially those teachers who use DI and do not experience a high level of stress would be interesting. In a recent study, Glock et al. (2019) argued that the composition of the student body, such as classrooms comprised of students with highly diverse performance levels, could contribute to teacher stress. Therefore, lack of resources and huge class sizes might be barriers for DI. It could also be possible that stress arises because teachers feel unprepared as well as unfamiliar with the appropriate practices to respond effectively to their students' needs (Glock et al., 2019).

Further results of the current study revealed that teachers' implementation of homogeneous ability grouping is positively correlated with higher stress levels due to the different learning abilities of the students. Taking all the necessary demands for planning in order to implement within-class homogeneous ability grouping into consideration (see e.g. Smale-Jacobse et al., 2019), it can be assumed that such a practice can potentially become challenging, complex, and thus distressing for teachers. This assumption could be a potential explanation for such results, especially when considering that previous research has shown that teachers have rated the adaption of the materials based on one or more student characteristics as one of the most difficult practices to implement (Gaitas & Alves Martins, 2017), as well as a stressful job demand (Shernoff et al., 2011; Skaalvik & Skaalvik, 2015). Nonetheless, research is needed in order to test such an assumption. In particular, interviewing teachers regarding the demands of their

profession and their perceptions of homogeneous ability grouping, as well as every other DI practice, could provide further insights.

In line with Katz (2015), no significant associations between job satisfaction and teachers' use of DI practices were found. When considering these findings, they might indicate that even though differentiating instruction is a complex inclusive instructional approach (van Geel et al., 2019), it might not necessarily directly, negatively affect teacher job satisfaction. A possible explanation for this would be that for some teachers using DI increases their job satisfaction, as they acknowledge that using DI maximises students' potential outcomes and results in them doing a better job, while not using DI could cause teachers to worry that they have not done enough. For other teachers, however, using DI is too demanding and stressful and leads to rather lower job satisfaction.

Lastly, it should not go unnoticed that the results from the MANCOVA analyses revealed significant variations across the different school tracks concerning the implementation of tiered assignments and homogeneous ability grouping. In line with studies on teachers' use of DI practices, teachers who worked with a more integrated school structure, as in general or comprehensive secondary schools, were found to make more frequent use of tiered assignments (Pozas et al., 2019).

## 8. Study 2: qualitative study

### 8.1. Sample and sampling

A total of 24 language arts teachers (in the subjects of German and English) working in different school tracks - namely advanced secondary schools (6 teachers), comprehensive schools (6 teachers), schools with integrated general and intermediate secondary school programmes (6 teachers) and cooperative organisational schools (6 teachers) - took part in the interviews voluntarily. All interviews were conducted in the German language and had a duration of 25–90 min. The sampling procedure was compiled following the methods of convenient and snowball sampling (Robinson, 2014). The interview protocol provided a sequential order for the interviewer, starting with a brief introduction followed by a description of the purpose and the session's rules, and continuing with a deeper focus on topical questions related to the research objectives. The interview guideline comprised questions on (1) heterogeneity in general, (2) implementation of DI practices

**Table 3**  
Interview scheme: question examples.

Section	Question Example
<b>Sociodemographic information</b>	<p>"For how long have you been teaching?"</p> <p>"Currently you are teaching at (school track).</p> <p>"Have you taught before in other school tracks?"</p>
<b>Heterogeneity in general</b>	<p>"What do you associate with the term 'heterogeneity'?"</p> <p>"Besides performance, in which other facets do you perceive student differences?"</p> <p>"How necessary is for you to address student heterogeneity in class?"</p>
<b>Implementation of DI practices in their daily preparation and teaching</b>	<p>"Does student heterogeneity in the classroom influence job satisfaction?"</p> <p>"In your own words, please describe what differentiated instruction is."</p> <p>"Which DI practices do you use in your daily teaching practice?"</p> <p>"How often do you implement such practices?"</p>
<b>Evaluation of DI</b>	<p>"Are there differentiated instructional practices that are better suited for a particular school subject/school grade?"</p> <p>"Do you consider differentiated instruction to have a positive or negative connotation?"</p> <p>"In your opinion, how do teachers feel with the fact that they are supposed to implement differentiated instruction?"</p> <p>"In your opinion, which resources are needed (e.g. provided by the school, state, etc.) to support the implementation of differentiated instruction in the classroom?"</p>

in their daily preparation and teaching, and (3) evaluation of DI (see Table 3). Using qualitative content analysis (Mayring, 2014), interviews were recorded, transcribed, and examined. Transcriptions were systematically analysed and categories were identified. Transcriptions of each category were coded and developed using the computer programme MaxQDa. Content structuring was performed following mixed procedure, combining deductive and inductive analysis (Mayring, 2014).

## 8.2. Data analysis

Data analysis was performed by using a category system following a deductive approach based on analysis of all thematic sections covered in the interview protocol. Further, the main categories were extended, inductively focusing on both teachers' negative and positive experiences of DI implementation and their relation to stress and job satisfaction as the main categories of analysis (intercoder reliability coefficient of 0.92; Holsti, 1969). After coding the entirety of the material, the inductively generated subcategories were examined by grouping the content units (units that could be classified into a single category) according to their thematic proximity. For the first main category (Job Satisfaction) five subcategories were found, and for the second main category (Stress), seven subcategories were determined (Table 2). A total of 229 content units<sup>1</sup> defined as text passages consisting of one or more full sentences were coded from the material within the category system of the study. Participants' quotes (direct translations) are included as a means to provide supporting evidence for the main categories (Creswell, 2012). Each quote presented below served as a "unit of meaning" (Table 4).

## 8.3. Results

As seen in Table 3, teachers expressed both positive experiences, such as when the teachers clearly saw the necessity of DI, and negative experiences, such as feelings of insufficiency, as a result of the implementation of DI. However, the distribution of content units within the two main categories of experiences ( $n = 166$  versus  $n = 63$ ) suggests that there is a tendency among teachers across all school tracks of experiencing stress, rather than a tendency to perceive oneself satisfactorily. From Table 3, it can be observed that most of the teachers' quotes relate rather more to negative experiences than to positive ones concerning the implementation of DI.

<sup>1</sup> The total amount of content units coded within a category and/or subcategory are represented by the use of  $n$ .

### 8.3.1. Teachers' positive experiences of DI implementation: experiences of satisfaction (category 1)

For the first category, 63 content units were revealed. In detail, the subcategory of "necessity" includes the most content units ( $n = 28$ ) overall. This subcategory includes teachers' comments on their perceptions of the necessity of implementing DI in order to instruct heterogeneous classrooms. Within this subcategory, there is an important difference between school types. Teachers working in schools with an integrative structure, such as comprehensive schools or schools with different courses of education, indicate a greater necessity of DI ( $n = 26$ ). In contrast, teachers working in advanced secondary schools where the school tracks grasp only one course of education that qualifies students for entrance to higher education comment a lower necessity of DI ( $n = 2$ ).

The following quote provided by a teacher of a cooperative, organisational form of school with different courses of education in the general and intermediate secondary school programmes shows that teaching in such a school would not be successful without the implementation of DI:

Were I not to implement DI, my teaching would not work at all. There would be chaos, because some students would be overwhelmed, others would feel challenged too little. The result then would be that the students would start private talks and focus on other things. The noise in the classroom would then be too much. (Teacher 1) (School with general and intermediate secondary school programs: cooperative form)

Moreover, several teachers across all school tracks expressed feeling successful, as it appears that they are able to value the utility that the implementation of DI brings to their teaching ( $n = 20$ ). For example, an advanced secondary school teacher (Teacher 2) stated, "It is no problem for me to differentiate, because the utility it brings is absolutely clear." According to another advanced secondary school teacher, Teacher 3, "Nevertheless, it is the feeling of knowing that you strengthened five or six students in a certain way. I get this back at the end of a sequence." Although only two advanced secondary school teachers express the necessity of implementing DI, some still perceive positive experiences such as utility and success when implementing it, while others claim that the use of DI does not bring additional costs. Even though no advanced secondary school teacher reports a feeling of achievement as a result of the use of DI, teachers working in integrative school tracks express this feeling ( $n = 7$ ) and mention that the use of DI also relieves them in class ( $n = 5$ ).

**Table 4**  
Category system: number of units of meaning extracted from the material.

Category overview	Advanced secondary school teachers	Comprehensive school teachers	Teachers of schools with different courses of education (integrative)	Teachers of schools with different courses of education (cooperative)	Total
Positive experiences (satisfaction)					<b>63</b>
<b>Necessity</b>	2	10	8	8	28
<b>Success and utility</b>	6	6	3	5	20
<b>Achievement</b>	–	4	2	1	7
<b>Relief in teaching</b>	1	3	1	–	5
<b>No additional cost</b>	2	–	–	1	3
Negative experiences (stress)					<b>166</b>
<b>Feeling of insufficiency</b>	12	20	8	9	49
<b>High workload through DI</b>	14	9	9	6	38
<b>Overextension</b>	1	6	4	8	19
<b>Perceived lack of solutions and support</b>	4	5	5	5	19
<b>DI is a challenge</b>	3	6	5	4	18
<b>Frustration</b>	1	1	5	5	12
<b>Avoidance</b>	10	–	1	–	11

8.3.2. *Teachers’ negative experiences of DI implementation: experiences of stress (category 2)*

Approximately three-quarters of all quotes (content units) could be sorted into this category. Hence, it appears that teachers perceive more negative experiences from the implementation of DI into their teaching practice. Some of these experiences include the lack of solutions or support (n = 19), perception of DI as a challenge (n = 18) and feelings of frustration (n = 12). Most of the teachers’ quotes relate to feelings of insufficiency concerning teaching itself, the concept of DI and the school system (n = 49). In particular, this feeling seems to be mostly expressed among teachers teaching in comprehensive schools (n = 20). Such teachers define the feeling of insufficiency as the knowledge of student heterogeneity in class and the lack of differentiating their instruction enough to address their students’ learning needs adequately. A teacher working in a cooperative school form expresses that there is no solution that helps prevent this feeling:

“Overwhelmed” is the wrong term. I believe [...] that there is a permanent feeling of running after something, of not being enough, of not having done enough. [...] Somebody who takes this [DI] seriously will never get rid of this feeling, because you are never done. (Teacher 4) (School with general and intermediate secondary school programs: cooperative form)

This quote may imply that the degree to which teachers implement DI in their everyday teaching is not enough to meet every student’s educational needs. This in turn causes a feeling of dissatisfaction, as many teachers think that they should do more to meet every learner’s needs, but do not have the time to offer individual curricula for every single student.

Likewise, teachers’ experiences of stress could also be related to the heavy workload that is derived from implementing DI practices (n = 38). Across all school tracks, teachers complain of the effort they need to exert in preparation for differentiated lessons. A teacher from a comprehensive secondary school states that he wants to differentiate but does not have the time to prepare adequately:

The question is: to what extent? Whether I have the time, and I am not saying that I do not want to work, but whether the day has enough hours to prepare the material I need to teach in three levels or, if possible, in four, to include the students with special needs on my own. Thus, there are more students that do

not belong to any of these four levels, that are somewhere in between. (Teacher 5) (Comprehensive secondary school)

Even though advanced secondary school teachers also complain about workload, they represent the sample group that express feeling the least overwhelmed (as identified by the content units n = 1) in comparison to other integrative school tracks (n = 18). Furthermore, the following quote from a teacher working in a school with general and intermediate secondary school programmes of the integrative form expresses that implementing DI is a job demand that stretches their own personal resources, therefore increasing their stress levels.

It [DI] does not work, because, keywords: teacher stress and burnout. We have quite high sickness absence rates because of stress. We are alone in the lessons and the teacher for special needs education is also overextended and is not able to provide any support. (Teacher 6) (School with general and intermediate secondary school programs: integrative form)

Furthermore, when exploring advanced secondary school teachers’ comments, it was identified that such educators tend to avoid the use of DI (n = 10). For example, an advanced secondary school teacher admits that she does not implement DI at all, and argues that DI is incompatible with the achievement of A-Levels:

That is why I do not differentiate, to be honest, because of the special situation here at this school. Nevertheless, I think that the methods of examination allow for differentiation. Every student has to do the same examinations in the end and if I had given them previously only pictures or some of them only got texts and others graphics, I do not know whether A-Levels could be achieved like that. (Teacher 7) (Advanced secondary school)

It is important to highlight that even though advanced secondary school teachers recognise the value of DI as well as the potential benefits of it, as reflected in the quotes by Teachers 2 and 3, in practice, they do not differentiate their instruction.

8.4. *Discussion of study 2*

The results of Study 2 reveal that teachers’ experiences of DI are rather complex. Teachers have both positive and negative experiences as a result of their DI practice. On the one hand, the qualitative analysis shows that teachers tend to perceive negative



experiences such as feelings of insufficiency, overextension, or frustration. Such findings are similar to literature and evidence regarding teachers' occupational well-being and stress (Kyriacou, 2001; Lazarus, 1991): a teaching task, such as DI, becomes stressful when the appraisal of one's own resources (i.e. lack of resources, lack of appropriate preparation) shows that they are not sufficient to cope appropriately with that particular job demand (Glock et al., 2019). This assumption could be supported by the results from various studies that reveal that teachers express concerns that they are not able to meet the job demand of addressing students' individual learning needs by means of DI (e.g. Skaalvik & Skaalvik, 2015).

However, on the other hand, the results also revealed that even though the majority of teachers' comments referred to negative experiences, it was still possible to identify content units that relate to positive experiences resulting from the implementation of DI. Such experiences are related to the important contribution of DI to student learning, which is reflected in teachers' feelings of success and utility (Hertberg-Davis & Brighton, 2006). Moreover, although these findings are not directly generalisable to all school track teachers, this study was able to show that, although advanced secondary school teachers have a different view of DI (i.e. the lack of need and value of DI), they do also experience certain positive effects of practicing DI. This is particularly interesting for educational systems that have strict external differentiation structures by means of tracking or streaming students, such as in Germany. For instance, advanced secondary school teachers in Germany are trained to teach a rather homogeneous student body (Glock et al., 2019), thus tend to consider it unnecessary to differentiate their instruction, and rarely address their students' learning needs (Pozas & Letzel, 2019). However, students do not only differ with regards to performance and ability, but also in regards to motivation, interest, and learning profiles. Thus, students within advanced secondary schools cannot be expected to be a homogeneous student population.

## 9. Discussion

This paper is based on an embedded sequential explanatory mixed-methods research design aimed at a comprehensive investigation of the effects of teachers' DI implementation on their overall stress due to different student learning abilities and job satisfaction. First, descriptive results reveal that teachers experience stress due to some extent to the different learning abilities of the students. Moreover, the results show that teachers do indeed make use of DI practices; however, DI appears not to be a part of their everyday instructional practice. Such results are consistent with a large body of international evidence that has continuously expressed concerns about the low frequency of teachers' DI implementation (Dijkstra et al., 2016; Schleicher, 2016; Smit & Humpert, 2012; van Geel et al., 2019). The critically low practice of DI might be related to the fact that teachers consider it to be a relatively demanding and challenging job obligation (Gaitas & Alves Martins, 2017; Skaalvik & Skaalvik, 2017b; van Geel et al., 2019).

Findings from both the quantitative and qualitative studies were able to shed further insights into such assumptions and provide further information into the specific experiences with which teachers were confronted. For instance, the qualitative study indicated that differentiating instruction conveys an increase in teachers' workloads. Thus, it can be assumed that the increase in workload relates not only to teaching in front of a classroom itself, but also to the stages before and after the actual teaching phase. This appears to be somewhat reflected within the correlation results from the quantitative study. A significant positive but low

correlation between the DI practice of homogeneous ability grouping and teacher stress due to the varying learning abilities of students was found. In contrast, practices such as the use of tiered quantitative assignments (i.e. giving more time, providing additional activities), heterogeneous grouping, tutoring systems and project-based learning were not shown to have any relation to teacher stress. When comparing these findings with previous existing research, it appears that those DI practices that do not require curriculum adaptation on the part of the teacher are considered more feasible and easier to implement (Gaitas & Alves Martins, 2017; Schumm & Vaughn, 1991). For instance, variants of tiered assignments such as allowing students who work faster to move on to the next assignment or allowing extra time to complete assignments are considered easy to adopt, and are therefore frequently used by teachers to differentiate their practice (Graham et al., 2016). This can be understood based on the fact that, e.g., providing additional time does not require teachers to conduct any additional methodological procedures. Nonetheless, it is important to highlight that the NEPS data only contains items that referred to a quantitative approach to tiered assignments and not to qualitative tiered assignments. Qualitative tiered assignments, as discussed in the theoretical background, refer to materials and tasks that vary in the complexity level of their content and which would require a purposeful and reflected adaptation to students' specific learning readiness. Bearing in mind previous research on the DI practices that teachers consider to be most difficult (Gaitas & Alves Martins, 2017), it could very well be possible that the correlation results within the quantitative study are not valid for qualitative tiered assignments. With this background, it would be important to conduct further research that provides deeper insights into the single DI practices of tiered assignments.

Another practice that was not significantly related to teacher stress is tutoring systems. Although such strategies have been described to require extra planning, preparation and accommodations in order to be set into motion (Pozas & Schneider, 2019), it appears to be considered by teachers an acceptable practice in terms of effort expenditure (Troia & Graham, 2017). However, in line with previous research (e.g. Troia & Graham, 2017), this study points out that teachers only occasionally implement such DI practices. Hence, it is necessary to gather additional in-depth empirical evidence that provides deeper understanding of the teachers' experiences practicing the diverse and single DI strategies.

Moreover, the qualitative study revealed that teachers experience feelings of insufficiency when addressing students' instructional needs. Skaalvik and Skaalvik (2015) have previously argued that these feelings of insufficiency are due to the fact that teachers lack time to appropriately plan and prepare DI, and feel unable to appropriately adapt their instruction. Thus, taking into consideration previous empirical research and the present study's results, it could be assumed that teachers might feel ill-prepared to apply DI, and might therefore feel overwhelmed by the responsibility of teaching heterogeneous classrooms. Such explanation could be supported by the other findings within the qualitative study. Throughout the interviews, teachers expressed a lack of solutions and support in terms of how to translate educational DI theory into actual classroom practice. The requirements for a high-quality implementation of DI are enormous (see e.g. Park & Datnow, 2017; Richards & Omdal, 2007; Tomlinson, 2017), so it is necessary to reflect which conditions are needed for DI. For instance, teachers need adequate resources which can be used effectively and flexibly. Further, enough staff is of course required, but also training and support. For future research, examining these aspects in order to get a more in-depth look into teachers working environment and how these mediate the relation of DI and stress is of

clear importance.

Concerning teachers' job satisfaction, the qualitative study provided certain insights. First, in line with findings from Katz (2015), teachers practicing DI feel successful, and therefore more satisfied and fulfilled in their daily teaching. Further, they reported that the use of DI provided them relief from their heavy workloads, specifically during the teaching phase.

Finally, an important finding from the quantitative study is that teachers working in schools with different courses of education appear to have higher levels of stress. Although findings from the qualitative study do not indicate overall differences across school tracks, they do at least pinpoint certain specific experiences of teachers working in such schools. For instance, as described by Teacher 6, who works in a school with different courses of education, teachers experience a highly stressful work environment and are confronted with a lack of time and support. According to Goldan & Schwab (2020), teachers' perceptions of resources (e.g. human, material and spatial resources) play a key role in how teachers experience inclusive schooling. Results from the authors' recent study revealed that students attending comprehensive schools (where different courses of education can be found) perceived fewer resources than students in other secondary school tracks. Based on this evidence, it could be assumed that teachers that perceive an inadequate supply of resources feel stressed and overwhelmed by not having what is necessary to appropriately and effectively differentiate their instruction.

## 10. Limitations

As in all, certain aspects of this study need to be addressed, as they limit the interpretation of the results. First, as Studies 1 and 2 were conducted independently, they cannot be directly combined. For future research, it would be interesting to run a quantitative study first, and select participants for qualitative, in-depth data collection based on clear sample strategies (e.g., selecting teachers with high and low stress levels, high use of DI and low use of DI).

Additionally, NEPS does not include items pertaining to some DI practices, such as staggered nonverbal learning aids and mastery learning. Moreover, given that the NEPS attempts to capture broad constructs with as few items *per* scale as possible, teachers' stress was measured using only one item. The use of single-item measures has raised important concerns throughout research. Diamantopoulos et al. (2012) explain that, when it comes to predictive validity, multi-item scales outperform single items, and therefore should be only used in special circumstances. Nonetheless, the decision to use this item was derived from recent research that has shown that such measures may be adequate when a construct primarily reflects a subjective experience (Gogol et al., 2014; Robins et al., 2001). Furthermore, the item selected to measure teachers' stress and job satisfaction are slightly (but not fully) related to the practice of DI. With such measurement tools, the quantitative study's results have to be interpreted very carefully. Against this backdrop, the present paper calls for future research to continue the investigation teachers' experiences, their perceptions of stress and job satisfaction and their relationship with DI, using appropriate multi-item scales that measure the constructs of stress and job satisfaction with a more straightforward link to teaching behaviours such as DI.

Concerning Study 2, it must be highlighted that participating teachers were not specifically asked to describe their positive and negative experiences in relation to each of the single DI practices, but rather in general terms of DI use. Given that the results from Study 1 shed some light into differential effects amongst the single DI practices, it is necessary that future research explore teachers' experiences implementing each individual DI practice. This would

help to expand the understanding behind the benefits, challenges and efforts derived from each of the broad arrays of DI practices that can be used to address student heterogeneity.

Lastly, although research has discussed the associations across teachers' self-efficacy in their implementation of DI and their stress and job satisfaction (Klassen & Chiu, 2010; Skaalvik & Skaalvik, 2015; Suprayogi et al., 2017), this variable was not included within the analyses. Hence, further research should explore the role of such variables, as it is a critical teacher variable in view of coping with DI challenges (Suprayogi et al., 2017).

## 11. Conclusion

Previous studies on DI have mostly focused on the positive effects of DI towards students. On the other hand, effects on teachers have been somewhat ignored. To summarise, the findings from this study confirmed that teacher practice of DI is a "two-sided coin" when it comes to focusing on the effects on teachers. There are, without doubt, positive effects on teachers' job satisfaction which arise from perceptions of achievement, for instance. However, there are negative effects resulting from teachers' implementation of DI that mainly originate from lack of time, support and workload associated with DI produces. Therefore, future research would need to gain more insights into teachers' working environments (e.g. resources) and other requirements (e.g. teacher training) to find out what is needed for high-quality implementation of DI without negative effects on teachers' well-being (e.g. teachers stress level and job satisfaction). Improving conditions to more easily implement DI would make the "positive side" of DI more visible. If teachers are able to experience more positive feelings and attitudes towards DI, the implementation rate would probably increase.

## Data availability

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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