Supporting intrinsic motivation and learning-friendly attributions in German student–teacher-conferences

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ABSTRACT

Promoting students' motivation to learn and supporting learning-friendly attributions is an important task for teachers. While doing so is possible in the classroom every day, there are also special situations with particular formats, such as student–teacher-conferences, which can be well-suited to supporting students' motivation to learn. German student–teacher-conferences (=German: Lernentwicklungsgespräche (LEGs); *translated literally: learning development conversations*) are a form of performance assessment and performance feedback in which elements of formative assessment can be implemented. This article examines whether LEGs correlate with intrinsic motivation and learning-friendly attributions when they are perceived by students as supportive of learning. For this purpose, 392 children in grade 2 (mainly at the age of 7 and 8) filled out questionnaires in a pre–post design. The results show that, from the children's point of view, LEGs are mostly implemented in ways that learners perceive as supportive of their learning and motivation; that said, there were significant differences both between teachers and between teachers' different LEGs. In addition, we observed a relationship between LEGs, intrinsic motivation and learning-friendly attributions, although it was depended on the children's perspective of how the LEGs were implemented.

1. An outline of the issues

Elementary school is the first common school for (almost) all children, and children arrive at school with heterogeneous experiences; for example in their linguistic backgrounds, experiences, and motivation.[1] In order to provide more equitable learning opportunities and to give justice to learners' heterogeneity, we need to ensure we provide them with individualised support for their learning processes that supports them in connecting what they already know and can do to the knowledge and practices they learn in school, as well as their motivation to meet these learning goals.

Formative assessment is one process by which teachers can learn more about students, help them to bridge their linguistic resources, knowledge and practices from home (Fine and Furtak 2020) and help them engage with and improve in school learning. Numerous research findings on feedback and formative assessment conducted in a variety of countries (e.g. Black and Harrison 2001; Furtak et al. 2016; Harks et al. 2014; Hattie 2009; Maier 2010) have shown that assessment conducted

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by teachers while learning is in progress and, in particular, the associated feedback on learners' performance can boost both performance and motivation. By providing teachers and students with information about learning goals and the status of their current learning, formative assessment is a key mechanism to build on students' prior experiences and to support them as they advance in their learning (e.g. Kingston and Nash 2011; Klute et al. 2017).

As early as Ingenkamp (1971), we have known that grades expressed in letters or numbers alone cannot provide feedback that informs future learning in the sense of promoting or supporting it. Instead, teachers' informal and daily assessment and feedback are more effective at promoting learning (e.g. Furtak et al. 2008). This said, studies have not found this form of assessment to be superior to grades delivered without accompanying comment (see, for example, Valtin and Wagner 2002). This seems to be connected to the quality of these assessments, which appear for the most part to simply translate grades into text without adding any real information about how to improve (Schmude 2002; Sacher 2014).

While many studies of feedback have been situated in the context of teachers' formative assessment practices, or students' responses to formative assessment tasks, there are many other contexts in which feedback may be provided to learners (e.g. Hattie and Timperley 2007). In this study, we are interested in the particular context of the student–teacher-conference, to which we will refer in what follows as 'LEG', the abbreviation for its typical German term, Lernentwicklungsgespräch (translated literally: learning development conversation). A LEG supports individual learning processes by supporting students to 'develop a realistic sense of their performance, take responsibility for their learning and gain motivation for learning on an independent basis' (Bildungspakt Bayern 2014, 107; translated by authors). LEGs have the potential to communicate assessment and the associated feedback in a manner that harnesses positive motivation for learning. The potential supporting motivation is related to the design of the conferences which align with various components of formative assessment, such as learner self-appraisal, informative feedback that provides guidance for future learning, and coming to agreement on clear goals going forward, with reviews of their attainment during the remainder of the school year (e.g. Borba and Olvera 2001; Dollinger, Hartinger, and Klippel 2020).

That said, variation exists in the ways that teachers facilitate LEGs with students, just as teachers' enactment of formative assessment also varies (e.g. Dini et al. 2020; Furtak et al. 2016). Our initial findings show that the learners in our study gave a positive evaluation of their LEG's realisation of formative assessment criteria, although we also found differences from class to class and from child to child (Ertl et al. 2022). In this paper, we seek to establish whether there is a correlation between the student-evaluated quality of LEGs and the advancement of motivational aspects of learning (intrinsic motivation and learning-friendly attributions).

2. LEGs[2]

A *LEG*, in the German context, is a 15- to 30-minute meeting between a student and their teacher, with at least one parent or guardian in attendance, to discuss the student's current performance, learning process, and the development of learning (Bildungspakt Bayern 2014; Bonanati 2018; Wilhelm 2015). The meeting's focus includes discussions of students' areas of stronger and weaker performance and the ways in which they might improve and advance their learning (Bildungspakt Bayern 2014; Bonanati 2018; Wilhelm 2015). The most important goal of an LEG is for students to receive helpful feedback that will support them in further learning. In addition, students should learn to evaluate their own learning at an early age. This is an important aspect of self-directed learning (Zimmerman and Martinez-Pons 1988). In some German states, such as Bavaria and Baden-Württemberg, the meeting can replace a progress report at the midpoint and/or at the end of the school year; in others, such as Hamburg and Thuringia, they supplement in-class learning. As a rule, the guidelines made by ministerial authorities on LEGs limit themselves to organisational matters such as who attends the meetings and requirements regarding documentation, alongside general guidelines on content, such as areas of competence where the student is doing well, and other areas where they might improve.

Above and beyond these, however, LEGs tend to incorporate particular elements beyond what we might expect in a regular classroom setting (e.g. Ertl, Kücherer, and Hartinger 2022b), such as (a) learner self-assessment prior to the meeting using a questionnaire or instruments suitable for the reflection of their own competences; (b) teacher completion of a form assessing the student's performance and skills, which then serves as a basis for documentation during the meeting itself; (c) delivery of feedback to the student on their performance in the course of the meeting; (d) agreement between student and teacher, during the meeting or at its conclusion, on goals going forward; and (e) reviews of whether the student has attained these goals in the course of the remaining school year.

In the context of our research, we have formulated the following quality criteria for LEGs, centring on their support function for individual learning processes (Dollinger, Hartinger, and Klippel 2020; Dollinger and Hartinger 2019). In doing so, we draw on the constituent criteria of formative assessment (cf. Black and Wiliam 2009; Maier 2015; Schmidinger, Hofmann, and Stern 2016) which relate to LEGs (for more information see also Ertl et al. 2022; Dollinger, Hartinger, and Klippel 2020; Dollinger and Hartinger 2019), and also referencing the typical components of an LEG, as follows:

- Recording and documentation of the student's current performance and the development of their learning as measured against individual and criterial reference standards;
- Inclusion of the student's self-assessment and their reflection on their performance and learning in the discussion;
- Feedback provided by the teacher that supports student learning;
- Student and teacher coming to agreement on clear, quantifiable goals for the student's further learning, and both parties are apprised of the criteria for meeting the goals; and
- Incorporation of the goals into the student's learning in the classroom, subject to regular review and can be adjusted if required.

We are not aware of any comparable international studies, especially from the elementary school sector, which have examined LEGs in this manner. Few empirical investigations into LEGs and their effects on learning within the school settings are currently known; for example, Bonanati (2018) and Mundwiler (2017) have used conversation analysis to explore the structure of the LEG dialogues, as well as individuals' participation. The quality of the LEG process from learners' perspective was at the centre of research conducted by Häbig (2018) at German academic high schools (Gymnasien). Our preliminary work in advance of the present study indicates that all parties to the LEG process concur with external observers in rating the feedback given in the meetings as overwhelmingly supportive of learning, despite substantial variations in the realisation of the concept's specific elements from case to case (Dollinger 2019, 2020; Ertl, Kücherer, and Hartinger 2022a). Initial findings (Dollinger and Hartinger 2019) indicated significant variance in the extent to which the quality criteria outlined above are realised, a tendency likewise noted by Betz et al. (2019, 73). More recently, we have confirmed these initial findings: The learners in our study gave a positive evaluation of their LEG's realisation of formative assessment criteria, although we also found differences from class to class and from child to child (Ertl et al. 2022).

Other work has uncovered links between the extent to which motivational aspects of learning come to fruition and learners' perceptions of the quality of LEGs in practice (Ertl et al. 2022; Ertl, Kücherer, and Hartinger 2022b). However, to date, studies have not yet explored effects of LEG on intrinsic motivation and learning-friendly attributions. The present study represents a response to this research gap.

3. Motivational aspects of learning

It has been well documented that receiving feedback regarding one's learning matters for student learning outcomes. Besides this, meta-analyses report that linkages of feedback with students'

motivations are less clear and often only weak (Wisniewski, Zierer, and Hattie 2020). This might be a function of the type of feedback: feedback administered in a controlling way, taking responsibility away from learners, and being uninformative can even have negative effects on motivation (Fong et al. 2019; Hattie and Timperley 2007; Ryan and Deci 2000). At the same time, these results also imply that if feedback is provided in a meaningful and well-construed way and combined with joint goal setting and considering students' perspectives – such as the concept of LEG strives for – it can positively influence students' motivation (Henderlong and Lepper 2002; Wisniewski, Zierer, and Hattie 2020). To this end, two prominent motivational constructs appear theoretically especially relevant outcomes: self-determined motivation and attributional styles.

These two aspects represent relevant motivational factors that can matter for students' learning, well-being, and psychosocial functioning in the long term (Brun, Pansu, and Dompnier 2021; Howard et al. 2021). In particular, students' self-determined motivation is highly predictive of how they engage in learning activities, and their attributional styles are fundamental for how they interpret ability cues of learning outcomes (such as grades or praise).

Self-determination theory (SDT; Deci and Ryan 2012) contains multiple mini-theories, one of which distinguishes motivation by the extent to which it is self-determined. Two kinds of motivation – intrinsic and external – are at two ends of this spectrum. Intrinsic motivation is the tendency to engage in an activity for its own sake, without regard for any external incentive or reward (Deci and Ryan 2012). In contrast, external motivation is driven by external rewards or punishments, compliance, or resistance (Deci and Ryan 2012). It has been very well documented that intrinsic motivation is more favourable than external motivation for students' learning engagement, in particular for elementary school students (see Pongračić, Hasanagić, and Komadina 2021). A fundamental premise for experiencing intrinsic motivation is that students' basic psychological needs for competence, autonomy, and social relatedness are satisfied (Deci and Ryan 1993; Ryan and Deci 2016).

We argue that the design of LEGs makes them well-suited to supporting students' needs for intrinsic motivation. By comparing the assessments of individual competencies, learning status and learning development (as a comparison of the actual and goal status), and then discussing and informing students about their performance status, students are able to experience competence, especially through teacher feedback and a focus on their strengths. By addressing and co-deciding the topics as well as the final goals, students have the opportunity to experience themselves as having autonomy, which can in turn support their engagement in learning (Stefanou et al. 2004). The experience of social relatedness is achieved through appreciative communication (e.g. through friendly listening and interested inquiries by the teacher), which makes students feel more connected to their teachers and as though they are being treated as equals.

Attribution Theory (Weiner 1986; see Graham 2020, for an overview) is concerned with the perceived causes of success and failure. These can be distinguished first by location and second by stability of the perceived causes (Graham 2020). Research has found that following success, it is especially helpful for students' subsequent learning if they seek the reasons within internal-variable reasons, such as students' learning effort, opposed to external-stable reasons, such as inherent difficulties of the subject (for an overview, see Graham 2020). Students attributions can be influenced by teachers' feedback (e.g. Foote 1999; Graham and Taylor 2016) and their self-perceptions (Stiensmeier-Pelster and Heckhausen 2018; Heckhausen and Heckhausen 2010) – central components in LEG. 'The reactions of *others* to students' successes and failures are just as important as the objective outcomes as sources of attributional information about the self' (Graham and Taylor 2016, 25; emphasis in original).

On the basis of these theoretical perspectives and prior research findings, we hypothesise that well construed and received LEGs can have effects on students' self-determined motivation and their attributional styles.

4. Research questions and hypothesis

Our research is guided by the following research questions:

1. Is there a positive development of students' intrinsic motivation and learning-friendly attributions by LEG?
2. Are there effects on students' intrinsic motivation and learning-friendly attributions depending on the qualitative implementation of the single elements of LEG (from the students' point of view)?

In line with earlier findings of our study about the development of academic self-concept and willingness to invest effort by LEG (Ertl, Kücherer, and Hartinger 2022b) we anticipate no or small changes on average but variance among the learners' classes and in turn to systematic differences among teachers' approaches to conducting LEGs.

In terms of effects on intrinsic motivation and learning-friendly attributions, we anticipate results in line with initial findings on effects on academic self-concept and willingness to invest effort (Ertl et al. 2022; Ertl, Kücherer, and Hartinger 2022b) as follows: a positive correlation between approving learner evaluation of the quality criteria (inclusion of the student's self-assessment, feedback supportive to learning, agreement on clear, quantifiable goals) and the development of intrinsic motivation and learning-friendly attributions.

5. Method

To answer our research questions, we conducted a pre–post study with 392 students who filled out a questionnaire concerning their motivation and attribution one week before the beginning of the LEG in their own class (T1) and on the Monday following their own LEG (T2), together with ratings of its quality. Full consent of participating students and their parents was obtained.[3] The study at hand was not preregistered and the data that the analyses are based on has been investigated before regarding academic self-concept and willingness to invest effort (Ertl et al. 2022; Ertl, Kücherer, and Hartinger 2022b).

5.1. Sample

The sample is composed of two cohorts in the 2018/2019 and 2019/2020 school years. The 392 participating students were in grade 2 (which means they are aged around seven to eight years) from 61 classes in 18 German elementary schools. Among the students, there were 178 boys and 176 girls (38 not specified).

5.2. Measures

To measure the constructs of interest, it should be taken into consideration that established scales cannot readily be used for K2 students, given difficulties in understanding and complexity. Thus, we relied on scales that have been confirmed for this specific population in the past, and self-constructed scales to adequately measure the constructs in question in the respective population. We describe the scales with indications of their reliability and validity below.

5.2.1. Intrinsic motivation and attribution style (T1 and T2)

We measured students' external and intrinsic motivation using a dominance pair comparison by Hartinger, Graumann, and Grittner (2004) based on the four motivation styles in the Self-Regulations-Questionnaire by Ryan and Connell (no year): external, introjected, identified and intrinsic. Each motivational style is assessed by two items, resulting in a total of twelve pair comparison results (e.g. 'I learn in class, (a) because I enjoy the class or (b) because I am supposed to'). The children

then had to choose one of the two options of each comparison. The value for the individual motivation style results from how often the respective alternative was selected and varies between 0 and 6.

Attribution styles were assessed with a similar pair comparison scale by Hartinger (2005) that first asks about attributions in the event of success and once in the event of failure. For each of the four attribution styles (internal stable/variable, external stable/variable), one item was considered, for a total of 12 pairwise comparisons (e.g. for success: 'If I am good in a learning objective test/test, that's because that I a) was lucky this time or b) made an effort'). The value for the individual attribution style for success and for failure results from how often the respective alternative was selected and varies between 0 and 3.

To determine the consistency of such pair comparisons, we followed the recommendations by Bortz, Lienert, and Boehnke (2008) to propose the calculation of a characteristic value based on inconsistent triads (to be avoided). Doing so, we found that none of the dominance pair comparisons (neither in the motivational nor in the attribution styles) showed inconsistent triads. This means, that testing reliability of the dominance pair comparisons is given (Bortz, Lienert, and Boehnke 2008).

5.2.2. Rating of the LEG (T2)

After the LEG was conducted, all students received a questionnaire to evaluate the LEG (Ertl et al. 2022; Ertl, Kücherer, and Hartinger 2022b). All items of this questionnaire were to be answered on a Likert-type scale with four answer options (0 = *completely wrong*, 1 = *quite wrong*, 2 = *quite true*, and 3 = *completely true*).

The children were first asked about the extent to which they perceived teacher feedback to be supportive of learning. This subscale ('Feedback supportive of learning') contained six items (e.g. 'Now I've had my LEG, I know exactly why I have got better or worse [in school]'). Analyses showed that the subscale has a good reliability (good internal consistency of Cronbach's alpha = .79). In addition, all items showed sufficiently high discriminatory power (r_{it} = .47–.58), showing that the individual items correlate with the subscale at an appropriate level.

The second subscale ('Appropriate and helpful goals') asks about the goals that have been set in the LEG. The children rate whether these goals are helpful for their further learning. This subscale contains five items (e.g. '[The goals] we have agreed on will help me in my learning'). This subscale is also sufficiently reliable (Cronbach's alpha = .65) with a good discriminatory power of the individual items (r_{it} = .36–.43).

In all LEGs we investigated, the children evaluated themselves in advance. Our third subscale ('account taken of learner self-assessment') was used to investigate whether this self-assessment of the children was taken into account during the LEG (or whether the focus was only on the teacher's assessment) (e.g. 'During my LEG, my teacher asked me what I'm good at'). This subscale is also sufficiently reliable (Cronbach's alpha = .60) with a good discriminatory power of the individual items (r_{it} = .39–.45).

Results of confirmatory factor analyses showed that a three-factor distinguishing between the hypothesised three aspects model described the data adequately (χ^2 = 128.94, df = 87, CFI = .95; TLI = .94; RMSEA = .035; SRMR = .049; χ^2/df = 1.48) and, in particular, a significantly better one or two-factor models that collapsed these three aspects (ΔCFI > .01, ΔTLI > .02, ΔRMSEA > .006, ΔSRMR > .004).

We used confirmatory factor analyses to check whether these three subscales should really be seen separately or whether it makes more sense and fits the data better if they are combined into one scale. For this purpose, we first calculated a factor analysis in which the items are assigned to the three subscales. We then calculated a factor analysis in which the items are combined into one overall scale. The comparison of the central characteristic values enables a decision to be made (e.g. Gatignon 2014).

5.3. Analyses

To answer our first hypothesis, we estimated a multivariate model in which the mean levels of external and intrinsic motivation as well as internal variable attributions by success or by failure were

specified at T1 and at T2 simultaneously. Using Wald-tests, we subsequently compared each construct for differences between T1 and T2.

To answer our second hypothesis, we estimated a multivariate model in which external and intrinsic motivation as well as internal variable attributions by success or by failure at T2 were regressed on external and intrinsic motivation as well as internal variable attributions by success or by failure at T1, respectively, as well as consideration of students' self-assessment, learning supportive feedback, and goal setting.

Because there are significant differences between boys and girls in the area of motivation and attributions (e.g. Meece, Glienke, and Burg 2006), we considered students' gender as a control variable for all analyses. Further, given substantial shared variance between different classes (ICC = .022–.143, see Table 1) for all variables, we considered the multilevel structure using 'type = complex', and considered the data distribution using MLR as an estimator using Mplus 8.1 (Muthén and Muthén 2018). Overall, there was little missing data (less than 2% per each item, per measurement point) that was handled using the EM-algorithm for all analyses.

6. Findings

The results presented in this section first refer to the descriptive results of the three LEG assessment subscales to get a first impression of them. As mentioned in the research questions, based on previous findings (Ertl, Kücherer, and Hartinger 2022b), we expect that on average there are no or only minor changes, but that variance between learners' classes and thus systematic differences between teachers' approaches to LEG implementation are evident. Next, further results are divided into two areas: First, the development of students' intrinsic motivation and learning-friendly attributions through LEG is focused on. This is significant because it provides insight into whether LEG's potential to positively influence student motivation is being realised. Building on this, results then follow on the impact on students' intrinsic motivation and learning-friendly attributions as a function of the qualitative implementation of the individual elements of the LEG (from the students' perspective). This allows us, to identify significant factors influencing intrinsic motivation and learning-friendly attributions in LEG, which in turn can be used to increase student motivation. Also based on previous findings (Ertl et al. 2022; Ertl, Kücherer, and Hartinger 2022b), a positive correlation is expected between learners' positive evaluation of the quality criteria and the development of intrinsic motivation and learning-friendly attributions.

We present descriptive statistics of all constructs in Table 1. Overall, inspection of the mean levels indicated that the LEGs were, on average, assessed in a fairly positive manner (with all means being

Table 1. Descriptive statistics.

	Descriptive statistics			
	M	*SD*	Skew	ICC
[1] Intrinsic motivation (T1)	3.65	1.44	−0.35	.063
[2] External motivation (T1)	3.33	1.31	−0.22	.093
[3] Internal variable attribution by success (T1)	1.95	0.89	−0.58	.133
[4] Internal variable attribution by failure (T1)	1.39	0.99	0.11	.066
[5] Intrinsic motivation (T2)	3.63	1.58	−0.43	.022
[6] External motivation (T2)	3.32	1.38	−0.14	.112
[7] Internal variable attribution by success (T2)	2.02	0.85	−0.72	.117
[8] Internal variable attribution by failure (T2)	1.53	1.00	0.02	.128
[9] Consideration of self-evaluations	2.14	0.63	−0.64	.093
[10] Learning supportive feedback	2.59	0.50	−1.39	.143
[11] Goal setting	2.58	0.45	−1.23	.082
[12] Gender	0.50	0.50	0.01	–

Note: Sample: [1]–[11] $N = 392$; Range (potential and actual): motivation (T1, T2) = 0–6, attribution (T1, T2) = 0–3, Range (potential): [9]–[11] = 0–3, Range (actual): [9] = 0–3, [10] = 0.33–3.00, [11] = 0.6–3.0; Gender: female = 0, male = 1.

over the theoretical mean of 1.5). Specifically, the students mostly stated that their pre-conducted self-assessment was taken into account in the LEG ($M = 2.14$, $SD = 0.63$), the received feedback as learning supportive ($M = 2.59$, $SD = 0.50$) and the goals as appropriate and helpful ($M = 2.58$, $SD = 0.45$). An important information can be found in the last column of the table. The ICCs indicate that there are significant differences (almost everywhere about 10% of the variance) between the classes we examined. The only exception here is intrinsic motivation (T1: 6.3%; T2: 2.2%).

Regarding our first hypothesis on mean level differences, the Wald-tests in the multivariate model showed one statistically significant difference between T1 and T2: The students rated internal-variable attribution by failure higher at T2 (T1: 1.39; T2: 1.53; Wald $\chi^2 = 5.4$, $df = 1$, $p = .019$), while the other comparisons were statistically not-significant (Wald $\chi^2 = 2.6$, $df = 1$, $p > .10$). This implies that LEG supports one pedagogically desirable attribution style – at least on average.

Finally, regarding our second hypothesis, the multivariate regression analysis (see Table 2) indicated that both motivations and attributions were moderately stable (with autoregressive effects ranging from .39 to .48). Changes in intrinsic motivation and internal-variable attribution by success could not be attributed to the considered predictors; but in line with our expectations, changes in external motivation were related to learning supportive feedback, and change in internal-variable attributions by failure were statistically significantly related to students' perceived goal setting. This means that for those students who perceived high learning supportive feedback, external motivation decreased relative to those who only perceived less supportive feedback ($\beta = -.18$). Moreover, the more students perceived good goal setting, the more their internal-variable attributions of failure tended to increase ($\beta = .11$). This finding is remarkable because it supports an important pedagogical concern. Particularly after poor performance, students are likely to lose self-confidence and thus their motivation to improve through effort. However, if students can be made to attribute such poor performance in a way that attributes the performance to something internal, rather than external, and thus see the lack of effort as the cause, then the chance that students will continue to learn and thus ultimately improve increases.

7. Analysis

Overall, our findings support our hypotheses, indicating that the motivation and attributions stay nearly constant from T1 to T2 (without internal-variable attributions by failure), although we also

Table 2. Results of the multivariate regression analyses.

	β (*S.E.*)			
	T2 Intrinsic motivation	T2 External motivation	T2 Internal variable attribution by success	T2 Internal variable attribution by failure
T1 Intrinsic motivation	**.48 (.04)**	–	–	–
T1 External motivation	–	**.39 (.05)**	–	–
T1 Internal variable attribution by success	–	–	**.45 (.05)**	–
T1 Internal variable attribution by failure	–	–	–	**.42 (.05)**
T2 Consideration of self-evaluations	−.05 (.05)	.07 (.05)	.01 (.05)	−.01 (.05)
T2 Learning supportive feedback	.15 (.07)	**−.18 (.07)**	−.06 (.06)	−.05 (.06)
T2 Goal setting	.06 (.06)	.05 (.07)	.08 (.06)	**.11 (.06)**
Gender	.03 (.05)	.06 (.05)	−09 (.06)	.05 (.04)
R^2	.29 (.04)	.19 (.04)	.23 (.04)	.19 (.04)

Note: $\chi^2 = 24.0$, $df = 12$, $p = .02$; CFI = .971; TLI = .909; RMSEA = .053; SRMR = .038. Correlations between the dependent variables as well as correlations between the independent variables were modelled but are not depicted for parsimony reasons. '–' indicates that the respective regression was not modelled. Statistically significant regression coefficients (at $p < .05$) are boldfaced. T1 = pre-test before LEG, T2 = post-test after LEG.

found differences from class to class. The students rate the LEG quite positively, with differences from class to class, indicating that the teachers conducted the LEGs in different ways. We have additionally observed associations between high-quality LEGs, as rated by learners, and favourable developments in students' external motivation and in their internal-variable attributions by failure. These links were particularly notable in relation to learners' perceptions of having been given feedback supportive of their learning (motivation) and set goals they felt appropriate and helpful (attribution). We were unable to identify associations with teachers' taking account of learners' self-assessment in their LEG.

Our findings are in line with results about the association between the quality of LEGs and students' academic self-concept and willingness to invest effort (Ertl et al. 2022; Ertl, Kücherer, and Hartinger 2022b) and confirm the importance of learning-supportive feedback and appropriate and helpful goals.

That there is no link between LEG and intrinsic motivation could be in the fact that LEG in the present study is done instead of an interim report. Although the students feel they were able to participate in and feel ownership of their LEGs, their own self-assessments are often taken into account, and they are involved in the considerations and decisions about the goals for further learning (Kücherer, Ertl, and Hartinger 2022) the topics as well the strength and weaknesses were talked about are given by the teachers or the report topics.

The individual reference standard is connected with effects on motivational aspects of learning (e.g. summarized in Rheinberg and Fries 2018; Köller 2005; Mischo and Rheinberg 1995, 140). Results of our observational data show that in LEGs the teachers' focus is on the actual performance and not on the performance development (e.g. Ertl and Hartinger 2021; Ertl, Kücherer, and Hartinger 2022b). Furthermore, there is only sometimes a discussion between the teacher and the students about concrete performance (Kücherer, Ertl, and Hartinger 2022). As such, we anticipate that students may receive poor or no information about the reasons for their actual performance or performance development; in this way, the teacher's feedback is not crucial for intrinsic motivation or the attributions (cf. Fong et al. 2019; Hattie and Timperley 2007; Ryan and Deci 2000). In contrast, goal setting has direct consequences for further learning. Working on goals and the effort they entail are intended to prevent weaker performance in the future. In this way, they signal to students that effort can be worthwhile, which in turn is associated with internal-variable attributions of failure. So, this could be the reason that the appropriate and helpful goals are connected with internal-variable attributions by failure.

As in our previous findings, our results were not consistent with our hypotheses in relation to account taken of learner self-assessment in the LEG. One possible reason for this could be the fact that the integration of the students is only on a superficial level (Kücherer, Ertl, and Hartinger 2022). For example, Bonanati (2018, 411) found in her conversation analyses that teachers' management of the meeting operationalizes learners' self-assessments less than a medium of specific discussion around the student's learning than as an object lesson in a particular self-assessment technique. Our findings underline the importance of delivering consistent feedback supportive of learning and agreeing upon appropriate and helpful goals within LEGs.

There are also some limitations from this study for research and practice of LEGs. Given the design of the study, we can identify some limitations that influence our recommendations for research and practice of LEGs. Following scientific paradigms for educational research (e.g. Shavelson and Towne 2002), we posed hypotheses for the present study to better understand the relationships between variables such as LEGs, intrinsic motivation and learning-friendly attributions using a pre–post design. At the same time, we sought to complement our study of students' development of intrinsic motivation by better understanding their experiences of the LEG from their own points of view, providing additional insights and context to support our interpretation of the pre–post measures. In this way, we followed a logic of inquiry by which our research methodologies were determined from the questions posed in the study (Howe and Eisenhart 1990). Additional studies might build upon the present findings to better understand the role of

context and participants' prior experiences and lived histories, providing additional data to help us to understand students' and teachers' experiences of LEGs (e.g. Erickson and Gutiérrez 2002; Maxwell 2004). These additional details about the meetings could provide potential guidance for LEGs in the future. So we did, for example, not consider the competencies of teaching staff required to provide feedback that supports learning and to agree on adequate goals and the influence of motivational aspects of learning; since prior research has indicated the difficulties teachers face in providing helpful feedback for student learning (e.g. Dini et al. 2020; Heritage et al. 2009), this is an area in which teachers may need more resources and time to learn this professional practice. Teachers may also need support for their professional learning to be able to build upon students' self-assessments in ways that feel meaningful to learners. In addition, participation in the study was voluntary, so positive selection can be assumed. It would also be interesting for future studies to use interviews and more detailed observations to explain more precisely the processes that influence changes in motivation and attributions. In further analyses, we will primarily examine the interactions in the videotaped LEG.

8. Conclusions

While LEGs are a foundational element of elementary school experiences in some states of Germany, teachers nevertheless have great latitude in terms of how they realize the LEGs. This is in part because there are no formal guidelines given for these conversations.

Looking at our findings it is very evident, that it is not the format of the LEG but its concrete implementation which is central to its effects. Student motivation improves only when teachers succeed in ensuring that their feedback is perceived as learning-supportive and that the goals set are perceived as helpful. This requires teachers to be highly effective in providing performance feedback, a challenging skill for teachers.

Sustained professional development for teachers with the focus on learning-supportive feedback and the agreement on clear and measurable goals could be a good way to improve the quality of LEGs. This professional learning could be supported by tools and guidelines for best practices, such as building on students' self-assessments in meaningful ways, as well as suggested forms of feedback to provide to learners. In addition, preservice future teachers could also be supported in learning best practices for enacting LEGs as part of their professional preparation. Interdisciplinary training formats appear relevant here in light of the influential character of LEGs in terms of motivational development and with regard to diagnostic aspects of assessment of student performance (Ertl, Kücherer, and Hartinger 2022a).

Notes

1. Ertl et al. (2022).
2. Based on Ertl et al. (2022).
3. Recruitment and data collection took place in compliance with data protection regulations at all steps. All necessary agencies and individuals (school board, professionals, parents) were asked for their consent under extensive informed consent prior to the surveys. Moreover, participation in the study is voluntary. The ethical guidelines of the German Psychological Society related to research were followed. In addition, the German Research Foundation and the Government of Swabia approved the study.

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