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How effective is learner-controlled instruction under classroom conditions? A systematic review

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ABSTRACT

This systematic review synthesises empirical studies investigating the effects of learner-controlled instruction under naturally occurring classroom conditions. Learner-controlled instruction is defined as an autonomy-supportive teaching strategy that provides learners with the right to make instructional decisions in the classroom. Twenty quasi-experimental studies from K–12 schools or higher education were identified and synthesised regarding the reported effects. The results show that learner-controlled instruction has a positive general effect for motivation-related outcomes. For cognitive outcomes, mixed findings were found. Advanced differential analyses reveal that organisational and content-related types of learner control work best for student motivation and learning. Furthermore, the effects are stronger in secondary education classrooms than in primary schools or universities. The implications for research and teaching practice are discussed.

1. Introduction

Due to COVID-19-related school closures, teaching and learning conditions worldwide have changed. Distance and home-based learning have become relevant educational settings for students in many countries during lockdowns (Andrew et al., 2020). In light of the pandemic, educators in schools and universities worldwide seek to transfer these new learning experiences by opening up their real-life classrooms to more student control and self-regulated learning (Ghazali, 2020). Thus, there is a need for feasible autonomy-supportive teaching strategies that effectively foster student learning. In this regard, the role of learner-controlled instruction has increased. As a concept, learner-controlled instruction can be defined as an autonomy-supportive intervention that provides learners with the right to make instructional decisions about relevant aspects of the classroom setting on their own (e.g., classroom rules, learning content, or learning activities) (Jolivette et al., 2002). The basic idea is that learners are responsible and create their own learning environment with meaningful and matching learning opportunities relying on their own interests, preferences, and needs, which—in consequence—is seen as supporting learning more effectively (Rainer & Guyton, 1999). However, despite the intuitive appeal of handing over instructional control to students, this educational approach is—beyond its topic in motivational psychology regarding self-determination theory (Jang et al., 2016)—not adequately empirically grounded within naturally occurring

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classroom conditions (Patall, 2010).

In classroom settings, the degree of instructional control can be thought of as a continuum, ranging from teacher-controlled instruction at one end, where students learn under conditions that are entirely predetermined by teachers (approaches such as *direct instruction*; Engelmann & Carnine, 1982), to more learner-controlled instruction at the other end, where the students have complete control about their learning environment, including tools, materials, places, collaboration, etc. (Valjataga & Laanpere, 2010). There has been a long discussion about this topic in research on learning and instruction, with authors arguing in favour of or against instructional approaches with high learner control. Most critics of learner-controlled instruction, for example, fear uncertainty, anarchy and curricular chaos, resulting in student and teacher frustration (Kirschner et al., 2006). However, a closer look at the large body of findings related to this issue shows that the question of the superiority or inferiority of approaches with high learner-controlled instruction is not sensitive enough to receive a differentiated picture of the real-life conditions under which learner-controlled instruction is implemented in the classroom (Williams, 1993).

To support the evidence-based discourse about the effectiveness of learner-controlled instruction in naturally occurring classroom settings, this systematic review aims to synthesise relevant empirical research during the last 40 years derived from primary, secondary, and higher education (classrooms in schools and universities). Thus, this review aims to contribute new knowledge regarding the effects of learner-controlled instruction on student learning and motivation. Furthermore, we aim to identify effective types of learner-controlled instruction in real-life classrooms. Therefore, this review provides a framework that can help teachers design learner-controlled environments for the classroom.

2. Theoretical background

2.1. Conceptual approaches and didactics of learner-controlled instruction

Learner control refers to instructional strategies through which learners can exercise a certain level of control over the events of instruction (Hannafin, 1984). In most classrooms, the pedagogical relationship between teachers and students is asymmetrical, since it is primarily teachers who choreograph and control the process of teaching and learning (Kansanen & Meri, 1999; Valjataga & Laanpere, 2010). On the contrary, in classrooms that learners control, the pedagogical relationship is more symmetrical because both students and teachers can decide about relevant aspects of teaching and learning, including path, pace, materials, curriculum, and the instructional approach (Hannafin, 1984; Shyu & Brown, 1992). In classroom settings, learner control is implemented, for instance, by handing over instructional choices to students (Flowerday & Bryant, 2001; Harper, 2007; Patall et al., 2008).

With reference to the German tradition of General Didactics (e.g., Zierer & Seel, 2012), Bohl and Kucharz (2010) provide a theoretical framework to identify and systematise different kinds of learner control in classroom environments. Whereas other models primarily address students' autonomous learning process itself or teachers' autonomy-supportive behaviour (e.g., Mechling et al., 2006; Stefanou et al., 2004), Bohl and Kucharz (2010) refer to the instructional design of the learning environment and, therefore, the learner-controlled classroom conditions. From this perspective, learner control can be distinguished into four non-hierarchical domains defining the organisational, methodical, content- and right/norm-related type of learner control (Fig. 1).

In this regard, students' control over the *time for learning* (the decision about how long they will work on a task), their *workplace* (the decision about where to work) and the *learning partner* (the decision about with whom students like to work) reflects learner control in the organisational domain. The rights to choose between different *learning activities/techniques* (e.g., student experiment, enquiry, field study), to select or manipulate the *material* (e.g., in a physical or biological experiment, simulations, etc.), and to decide about the *format of presenting* results (e.g., posters, texts, video, podcast, etc.) resides within the methodical domain. The content-related domain relates to students' control over the *subject* (e.g., whether they do math or physics), the learning *topic* (e.g., different topics within the physics curriculum), and the *learning task* (e.g., tasks on different difficulty levels). Finally, the learner's control over *classroom rules* (e.g., regarding how to handle classroom disruptions), *learning objectives* (e.g., the key concepts or skills students have to master), or the

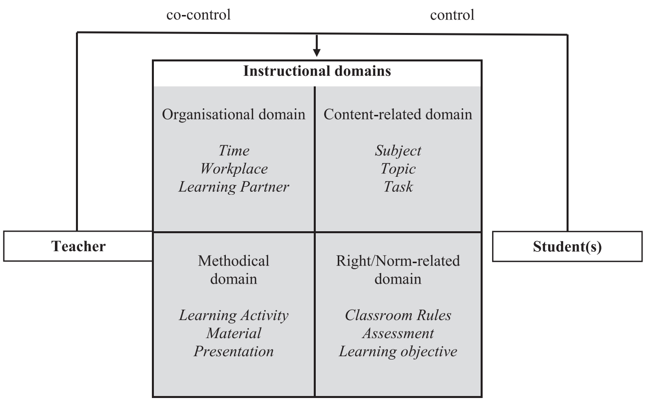

Fig. 1. Domains of learner-control.

way of *assessment/evaluation* (e.g., which criteria are used to grade a test) are linked to the domain of rights and norms.

The foundation of learner-controlled instruction goes back to the progressive educational movements at the beginning of the 20th century in the US and Europe (Lamberti, 2000; Sherman, 2009; Smith, 1997). Most proponents of these educational movements, commonly considered *alternative and progressive*, hold the view summarised by Miller (2004) that:

> "the learner's freedom and autonomy should be limited as little as possible, even not at all. Learning always starts with the individual's needs, goals, and desires, and not with any supposed body of knowledge or societal demands. For these educators, the ideal education embraces the exact opposite of transmission: It centres on a learner's entirely self-motivated exploration of whatever the world has to offer that seems relevant to the learner's own life." (p. 9)

Specifically, in the US and the UK, this ideal was represented by the *free school movement* in the late 1960 s/early 1970 s (Neill, 1960) and could also be found in the concept of *open education* (Barth, 1972; Smith, 1997), as well as in *learner-centred instruction* from the 1980 s (Cox, 1982; Wydra, 1980). In Germany, learner-controlled instruction has mostly been embedded in instructional strategies that refer to the reform-pedagogical concept of *Offener Unterricht* (Bohl & Kucharz, 2010). Herein, students, for example, individually organise and structure their learning using plans over a certain period of time (daily, weekly or monthly) (Dalland & Klette, 2014).

2.2. Empirical research on learner-controlled instruction

To date, there are only a few studies which empirically investigated the effect of learner-controlled instruction on learning and motivation under naturally occurred classroom conditions. However, different conceptual approaches of learner-controlled instruction are examined in other research contexts, such as studies referring to (1) traditional motivational theories (e.g., self-determination theory (Deci & Ryan, 2000) and reinforcement theory (Skinner, 2014)), (2) theories derived from reform-based science teaching (e.g., active learning (Freeman et al., 2014) and inquiry-based learning (Furtak et al., 2012)) and (3) theories of open education (Giaconia & Hedges, 1982).

(1) Findings deriving from the literature of motivational theory underpin basic assumptions of learner-controlled instruction, for instance, the idea of satisfying learners' desire of self-organize experience and behaviour (Deci & Ryan, 2000). Studies show that the degree to which students perceive their external learning environment as autonomy-supportive determines and reinforces their engagement and learning (Conesa et al., 2022). So far, numerous studies have presented evidence for the positive effects of autonomy-supportive instructional designs (Reeve & Cheon, 2021). In an autonomy-supportive classroom, students are likelier to show greater perceived academic competence, better academic performance, and increased achievement, motivation, and engagement (Bozack et al., 2008; Stroet et al., 2013). Thus, from the perspective of motivational theories, learner-controlled instruction can be described as a relevant and promising teaching approach that satisfy students' basic need for autonomy (Reeve et al., 1999; Skinner & Belmont, 1993).

(2) Further insights into the effects of learner-controlled instruction are indicted by research in the field of reform-based science teaching referring to active and inquiry-based learning interventions. The literature in this field supports the idea that active learning environments in which students design and follow their own learning paths increase their learning and performance (e.g., Furtak et al., 2012; Furtak & Kunter, 2012; Freeman et al., 2014). For instance, the meta-analysis of Freeman et al. (2014) investigates the role of active learning in contrast to learning under traditional, instructor-focus lecturing conditions. The findings indicate that on average, student performance increased, and students were less likely to fail under active learning conditions. Similar positive findings were found in other studies investigating inquiry-based teaching interventions (e.g., Furtak et al., 2012; Lazonder & Harmsen, 2016). Hereby, the literature sheds light on the role of teacher guidance whose absence is often argued as a failure for inquiry-based science teaching (Kirschner et al., 2006; Zacharia et al., 2015). The results of a two meta-analysis, conducted by Furtak et al. (2012) and Lazonder & Harmsen (2016), affirm this argument and shows that unstructured student-led activities are less effective than teacher-guided inquiry designs.

(3) More evidence about the role of learner-controlled instruction is provided by research investigating the traditional theories of open education (e.g., Giaconia & Hedges, 1982). Open education programmes, that were popular in US schools in the late 1970′s/early 1980′s, also share basic assumptions with the conceptual approaches of learner-controlled instruction (e.g., students' free choice of activity). In a systematic review and meta-analysis, Giaconia & Hedges (1982) investigated the effects of open education programmes on student achievement and non-achievement outcomes. The analysis from Giaconia and Hedges (1982) built on previous reviews by Horwitz (1979), Peterson (1980), and Hedges et al. (1981) and revealed that students' academic achievement and motivation in math, reading, and language arts were better in traditional classroom settings than in open education classrooms. In contrast, small positive effects were found for affective measures, such as creativity and collaboration skills.

However, other studies and systematic reviews could not confirm the results found by Giaconia and Hedges (1982). For instance, the quantitative synthesis from Hetzel et al. (1980) showed no difference between open and traditional teaching styles. A view of the individual studies shows that in most reviews on open education, the effect sizes vary considerably between the studies, so it is unclear to what extent the findings are related to the same treatment conditions. Marshall (1981) suggested, therefore, that future research on the effectiveness of open education should instead focus on specific components of open education (e.g., learner control) and relate these separate features to student (cognitive and motivational-affective) outcomes. After the intense research was conducted on open education programmes during the 1980 s and 1990 s, research interest in open education significantly decreased. Instead, there was a significant shift in educational research towards a more technology-assisted form of open education as digitisation progressed (Karich et al., 2014; Lin & Hsieh, 2001; Niemiec et al., 1996).

In non-technology-assisted classroom conditions, until now, only few studies on learner control are available. However, these individual studies do not allow a systematic comparison or statements about generalising the effects of learner control on student learning or motivation. Hence, there is a need for a systematic review to synthesise empirical findings about the effectiveness of learner-controlled instruction. For this reason, the unique value of the present study is to provide evidence of the real-life conditions and effects of autonomy-based learning in the context of student-controlled classroom environments by considering different types of learner control.

3. The present study

This systematic review synthesises empirical studies investigating the effects of learner-controlled instruction on student learning and motivation in regular, non-technology-assisted, real-life classroom conditions. We were interested in high-quality research findings from quasi-experimental studies in learning and instruction. To disentangle and analyse the effect of learner control, we focused on empirical studies that examine learner control as *independent variable(s)* and its impact on student outcomes (learning and motivation) as a *dependent variable*. Furthermore, we investigate differential effects by focusing on the educational stage (primary school, secondary school, higher education) and different types of learner control (organisational, methodical, content and right/norm-related types). The following research questions guided our study:

1a.To what extent does learner-controlled instruction generally enhance student learning in naturalistic classroom conditions?

1b.To what extent does learner-controlled instruction have differential effects on student learning related to the educational stage or certain types of learner control?

2a.To what extent does learner-controlled instruction enhance student motivation in naturalistic classroom conditions?

2b.To what extent does learner-controlled instruction have differential effects on student motivation related to the educational stage or certain types of learner control?

4. Methods

4.1. Literature search and screening

We identified the empirical studies through a systematic review based on the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) standards (Moher, Liberati, Tetzlaff, & Altman, 2009). The literature search utilised all major scientific online databases (Web of Science, Eric Database, PsyIndex, PsycInfo, Scopus and Pedocs). As a starting point for the literature search, we considered the last major review conducted by Giaconia and Hedges (1982). The last search was conducted on December 10th, 2020. In the following, we present the complete search strategy for the Web of Science database.

> **TOPIC:** ("learner control*" OR "student control*" OR "autonomy-based" OR "unguided" OR "minimal guided" OR "student choice" OR "choice of activity" OR "indirect instruction" OR "individualised" OR "student selection" OR "student agency" OR "instructional choice")
>
> *AND* **TOPIC:** ("experiment*" OR "intervention*")
>
> *NOT* **TOPIC:** ("virtual" OR "web-based" OR "computer-support*" OR "e-learning" OR "digital" OR "multimedia" OR "online" OR "computer-based" OR "technology")
>
> **Refined by: WEB OF SCIENCE CATEGORIES:** (EDUCATION EDUCATIONAL RESEARCH OR PSYCHOLOGY EDUCATIONAL) AND **DOCUMENT TYPES:** (ARTICLE)
>
> **Timespan:** 1982–2020.

Table 1
Inclusion and exclusion criteria.

Criteria	Included - The study …	Excluded – The study…
Date	was published between 1982 and 2020.	is older than 1982.
Research Design	based on an quasi-experimental research designs.	based on other research designs (e.g., correlational studies, regression analysis, surveys).
Implementation	precisely describe the implementation / conditions of learner-controlled instrution.	does not provide sufficient information about the implementation /conditions of learner-controlled instruction.
Setting	focus on naturally occurred classrooms in school or university.	focus on digital, virtual or web-based learning environments or on no-classroom settings (e.g. individual lab settings).
Sample	focus on students in primary school, high school or university.	focus on other educational settings (e.g., in-service teacher professional development, pre-school children)
Results	contained results on student learning and/or motivation.	does not focus on student learning and/or motivation.
Language	is published in English or German.	is published in languages other than English or German.

Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC.

This search strategy employing Boolean logic combinations was adopted in all other scientific online databases. The search resulted in a total of 427 potential studies. All titles were compiled in Endnote and then cleaned up by removing duplicates. Based on this literature search strategy, our final database included 398 articles.

In the next step, we screened the titles and, if necessary, the abstracts by taking the following criteria into account (Table 1). We started with the primary research question, the empirical research design, the description of the learning environment and, finally, the results. Fig. 2 provides the PRISMA flow chart to summarise our study inclusion process.

4.2. Sample of studies

This review consisted of twelve English-speaking and four German-speaking articles, which included $N = 20$ empirical studies that met the criteria of the literature review (Bätz et al., 2009; Blumberg et al., 2004; Desch et al., 2015; Flowerday & Schraw, 2003

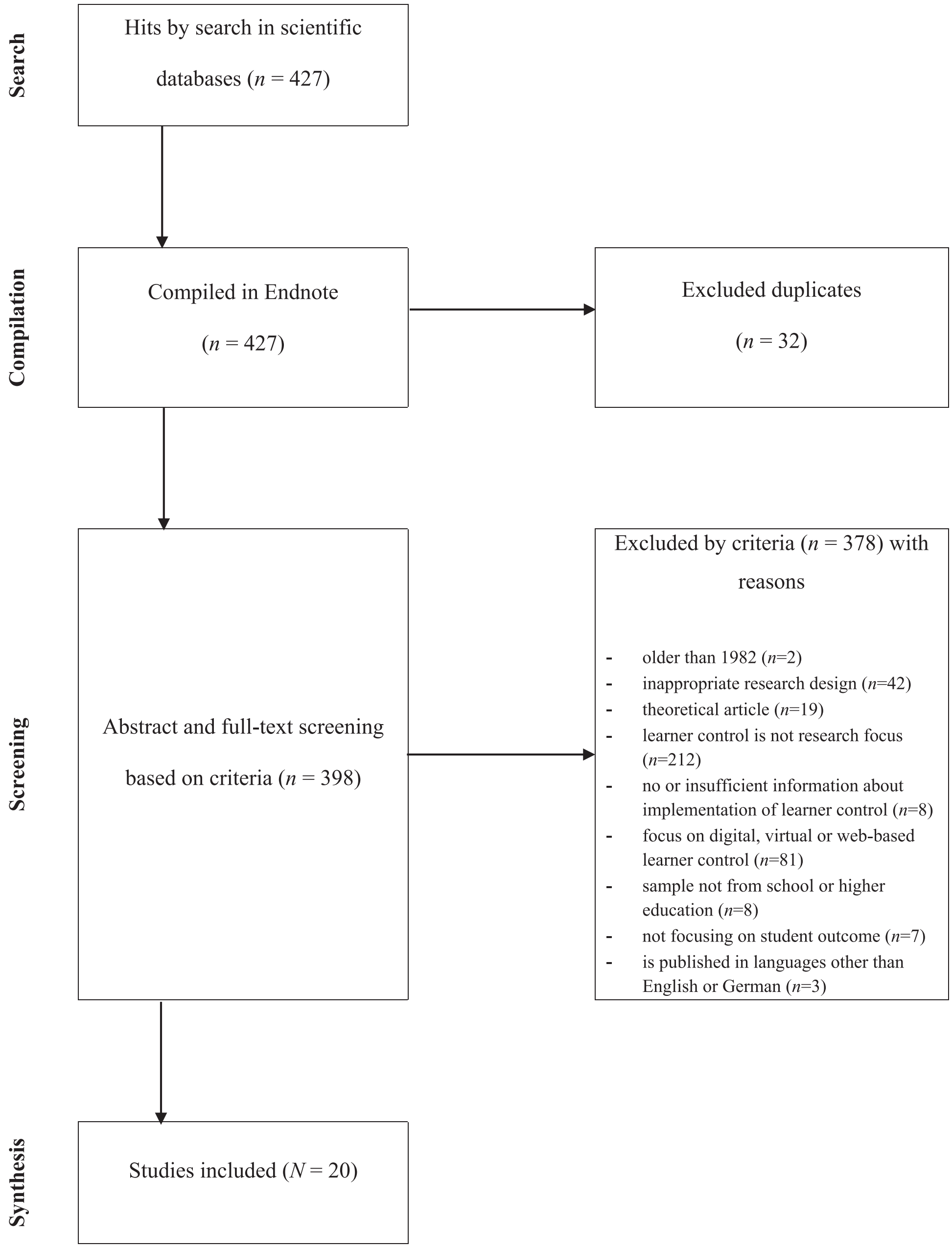

Fig. 2. Literature search.

(includes two studies); Flowerday et al., 2004 (consists of two studies); Flunger et al., 2019; Furtak & Kunter, 2012; Hardy et al., 2006; Hartinger, 2002; Hushman & Marley, 2015; Logan et al., 2013; Mozgalina, 2015 (contains two studies); Patall et al., 2010; Schraw et al., 1998 (includes two studies); Wang, 2010; Wijnia et al., 2015).

4.3. Risk of bias assessment

To evaluate the risk of bias in the results of the reported studies, we first proved the peer-reviewed status of the included studies. Thirteen articles were published in peer-reviewed journals, with an impact factor ranging from approximately 0.5 to 5.9 [Journal Citation Reports (JCR) for 2020]. Three articles (Bätz et al., 2009; Blumberg et al., 2004; Hartinger, 2002) were published in edited books. In the next step, the first author and a trained research assistant independently conducted the Cochrane Risk Assessment using the Risk Of Bias in Non-Randomised Studies of Interventions (ROBINS-I) tool (Sterne et al., 2016). The results showed a high interrater agreement (Cohens $\kappa = 0.89$ based on a comparison of five randomly chosen studies). The results, summarised in Fig. 3, showed that the highest risk of bias is caused by the missing control of relevant confounding variables (e.g., the achievement level or the students' self-regulation skills). Furthermore, eight of the reported studies cannot be considered comparable to a randomised trial because they use quasi-experimental designs focusing on participants who are part of a naturally composed group (e.g., classes or university seminars). Finally, a bias in selecting the reported results could not be controlled because most of the included primary studies did not provide pre-registered statistical analysis plans.

4.4. Synthesis

We conducted a within-study analysis to synthesise the research design and the results of each study (Petticrew & Roberts, 2006). Therefore, we extracted essential characteristics of a) sample size, b) educational setting, c) type of instructional control, and d)

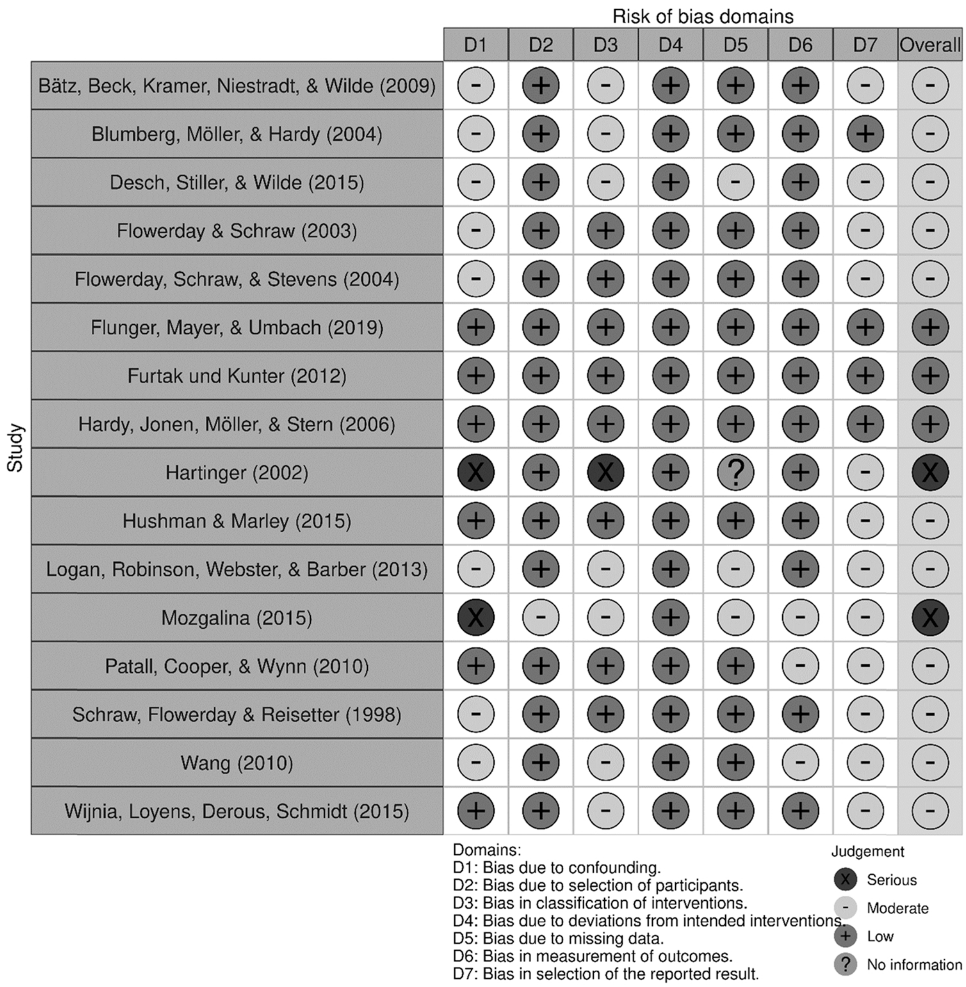

Fig. 3. Risk of bias assessment.

outcome measure(s). The educational setting encompasses information about whether the experiment was conducted in a primary school, a secondary school, or a group of university students.

With regard to the theoretical framework developed by Bohl and Kucharz (2010), we coded whether learner control was organisational, methodical, content- or right/norm-related.

Outcome measures were coded as either learning or motivation: We considered *learning* to be all cognitive processes of acquiring or modifying knowledge, behaviours, skills, values, or preferences (Gross, 2015). In the reviewed studies, terms and concepts related to this understanding of learning are knowledge building, science learning, text comprehension, objective control skill, and listening comprehension. Affective components, which include intentional goals and the effort and intensity of the learning process (Schunk et al., 2012), were coded as *motivation*. In the reviewed studies, this concept was addressed concerning student engagement, perceived competence, joy, interest, self-efficacy, and self-determination.

All coding results were verified by two independent researchers (one of the study's co-authors and one trained research assistant). We piloted the coding scheme using one-third of the sample (seven studies with 49 codes). The rater agreement showed an acceptable match with Cohens $\kappa = 0.83$. To further improve the rater agreement, all coding instances were verbally compared, and a small number of problematic cases involving disagreements were discussed extensively. All discrepancies were resolved through consensus (Chaturvedi & Shweta, 2015).

4.5. Calculating effect size

We used the standardised mean difference (*SMD*) to calculate the effect of learner-controlled instruction on student learning and motivation (Cohen, 1988). Therefore, we subtracted the mean of the treatment (i.e., learner-controlled condition) from that of the control group (i.e., not learner-controlled condition) and divided the difference by the average of their standard deviations. Hence, positive effect sizes indicate that students in the learner-controlled condition learned better or were more motivated than students without these rights. For example, in studies with more than one group, in a 3 (time) x 3 (group) repeated-measures design, the effect sizes refer to the differences between the learner-controlled conditions and the other groups. When the study did not explicitly report values (means or standard deviations), we first attempted to contact the authors directly. If this was unsuccessful, but a corresponding inference test was reported, we calculated the effect size by conversion (e.g., *t*-values to *d* by using the formula recommended by Thalheimer and Cook (2002) and Cohen (1988). We calculated the median of the reported effects for the overall general effect. Considering the small number of studies, random-or mixed-effects meta-analytic models were not feasible (Borenstein & Higgins, 2013).

5. Results

5.1. Effect on student learning

General effect. For the first research question (Q1a), we investigated the general effect of learner-controlled instruction in naturalistic classrooms on student learning. The literature search uncovered 10 relevant studies published between 1998 and 2015. The studies reported $k = 19$ separate effects based on 13 samples, ranging from 25 to 407 students. Overall, studies show mixed results in student learning, with effect sizes ranging from – 1.54 *SMD* to + 0.32 *SMD* (*Mdn* = + 0.04 *SMD*). Eight of the measured effects were

Table 2
Characteristics of studies that focus on student learning.

Author (year)	Sample-size	Setting	Type	Outcome	*SMD*
Flowerday & Schraw (2003)	45	U	C	Interpretation Skills	+ 0.19
Flowerday & Schraw (2003)	87	U	O	Interpretation Skills (Multiple Choice Test)	+ 0.09
Flowerday & Schraw (2003)	87	U	O	Interpretation Skills (Essay)	– 0.62
Flowerday *et al.* (2004)	98	U	M	Text Understanding (Mulitple Choice Test)	+ 0.20
Flowerday *et al.* (2004)	98	U	M	Text Understanding (Essay)	– 0.64
Flowerday *et al.* (2004)	106	U	M	Text Understanding (Mulitple Choice Test)	+ 0.16
Flowerday *et al.* (2004)	106	U	M	Text Understanding (Essay)	– 0.32
Furtak und Kunter (2012)	20	S	M	Scientific Knowledge	– 0.79
Hardy, Jonen, Möller, & Stern (2006)	161	P	M and C	Scientific Knowledge (Water Displacement)	+ 0.05
Hardy, Jonen, Möller, & Stern (2006)	161	P	M and C	Scientific Knowledge (Floating ans Sinking)	– 0.28
Hushman & Marley (2015)	60	P	M	Science Knowledge	– 1.54
Logan *et al.* (2013)	25	P	C	Physical Skill	– 0.56
Patall *et al.* (2010)	206	S	C	Behaviour (Homework completion)	+ 0.15
Patall *et al.* (2010)	206	S	C	Subject-specific Knowledge	+ 0.19
Schraw *et al.* (1998)	78	U	M	Text understanding	+ 0.14
Schraw *et al.* (1998)	164	U	M	Text understanding	+ 0.04
Wang (2010)	102	U	O	Listening Comprehension	+ 0.08
Wijnia *et al.* (2015)	60	U	M	Knowledge about Conflict Solving (Closed Questions)	– 0.55
Wijnia *et al.* (2015)	60	U	M	Knowledge about Conflict Solving (Open Questions)	+ 0.32

Note. P = Primary school; S = Secondary school; U = University; O = Organisational; M = Methodical; C = Content; RN = Right/Norms; *SMD* = Standardizided Mean Difference.

negative and 11 in a positive direction. Table 2 presents a detailed overview of the studies' characteristics.

Twelve effects were examined in university settings, four in primary schools and three in secondary schools. Most studies focus on the impact on students' knowledge (seven studies) and text comprehension (six studies), followed by students' interpretation skills (three studies), physical skills, listening comprehension and learning behaviour (one study each). Of the documented effects, 10 represent learners' control in the methodical domain. Four refer to content-related learner control, three to organisational learner control, and two effects refer to mixed conditions in which students can simultaneously decide about the learning material and content.

Differential effects. With the second research question (Q1b), we investigated the differential effects of learner-controlled instruction on student learning. The main finding is that different types of learner control affect student learning differently. In the context of methodical-related learner control, nine studies showed $k = 10$ mixed effects on student learning, with effect sizes ranging from – 1.54 *SMD* to + 0.32 *SMD* (*Mdn* = – 0.14 *SMD*). Mixed findings were also reported concerning classroom settings in which students were offered methodical and content-related types of learner control simultaneously (one study reported $k = 2$ effects ranging from – 0.28 *SMD* to + 0.05 *SMD, Mdn* = – 0.12 *SMD)*. Content-related types of learner control showed $k = 4$ mixed effects ranging from – 0.56 *SMD* to + 0.19 *SMD* (*Mdn* = + 0.17) reported in three studies. The strongest effects were measured for organisational types of learner control (two studies with $k = 3$ effects ranging from – 0.19 *SMD* to + 0.51 *SMD, Mdn* = + 0.47 *SMD)*.

Another main finding is that only students in secondary schools benefit minimally from implementing learner-controlled instruction in their classrooms on a cognitive level (two studies reported $k = 3$ mixed effects ranging from – 0.8 *SMD* to + 0.19 *SMD*, *Mdn* = + 0.15 *SMD*). Mixed effects were reported for students in universities (five studies based on $k = 12$ effects ranging from – 0.64 *SMD* to + 0.32 *SMD*, *Mdn* = + 0.08 *SMD*) and mostly negative effects for students in primary school (three studies with $k = 4$ effects ranging from – 1.53 *SMD* to + 0.05 *SMD*, *Mdn* = – 0.42 *SMD*).

5.2. Effect on student motivation

General effect. The third research question (Q2a) focuses on the beneficial effect of learner-controlled instruction on student motivation. The literature search uncovered 13 studies published between 1998 and 2019. The studies reported $k = 33$ separate effects based on 16 samples ranging from 20 to 365 students. Studies show small positive effects on student motivation, with effect sizes ranging from – 0.81 *SMD* to + 1.02 *SMD* (*Mdn* = + 0.18 *SMD*). Nine of the effects are negative, and 24 are in a positive direction.

Table 3
Characteristics of studies that focus on student motivation.

Author (year)	Sample-size	Setting	Type	Outcome	*SMD*
Bätz *et al.* (2009)	96	S	M and C	Flow	+ 0.80
Blumberg *et al.* (2004)	73	P	O and C	Interest	+ 0.25
Blumberg *et al.* (2004)	73	P	O and C	Perceived Competence	+ 0.37
Blumberg *et al.* (2004)	73	P	O and C	Engagement	+ 0.45
Blumberg *et al.* (2004)	73	P	O and C	Interest	– 0.40
Blumberg *et al.* (2004)	73	P	O and C	Perceived Competence	– 0.81
Blumberg *et al.* (2004)	73	P	O and C	Engagement	– 0.65
Desch *et al.* (2015)	72	S	C	Situational Interest (High)	+ 0.72
Desch *et al.* (2015)	72	S	C	Situational Interest (Low)	+ 0.66
Flowerday & Schraw (2003)	45	U	C	Interest	+ 0.30
Flowerday & Schraw (2003)	87	U	O	Interest	– 0.05
Flowerday *et al.* (2004)	98	U	M	Topic Interest	+ 0.21
Flowerday *et al.* (2004)	98	U	M	Situational Interest	+ 0.18
Flowerday *et al.* (2004)	98	U	M	Attitude	+ 0.12
Flowerday *et al.* (2004)	106	U	M	Topic Interest	+ 0.10
Flowerday *et al.* (2004)	106	U	M	Situational Interest	– 0.13
Flowerday *et al.* (2004)	106	U	M	Attitude	– 0.14
Flunger *et al.* (2019)	345	S	M and C	Perceived Competence	+ 1.02
Flunger *et al.* (2019)	345	S	M and C	Joy	+ 0.85
Flunger *et al.* (2019)	345	S	M and C	Interest	+ 0.67
Furtak und Kunter (2012)	20	S	M	Interest	– 0.71
Hartinger (2002)	96	P	C	Self-regulation	+ 0.50
Hartinger (2002)	96	P	C	Interest	+ 0.45
Hushman & Marley (2015)	60	P	M	Self Efficacy	+ 0.23
Mozgalina (2015)	120	U	C	Task engagement	– 0.14
Mozgalina (2015)	120	U	M and C	Task engagement	– 0.61
Patall *et al.* (2010)	206	S	C	Interest	+ 0.17
Patall *et al.* (2010)	206	S	C	Perceived Competence	+ 0.15
Patall *et al.* (2010)	206	S	C	Perceived Value	0.00
Schraw *et al.* (1998)	78	U	M	Interest	+ 0.18
Schraw *et al.* (1998)	164	U	M	Interest	+ 0.57
Wijnia *et al.* (2015)	60	U	M	Autonomous Motivation	+ 0.53
Wijnia *et al.* (2015)	60	U	M	Controlled Motivation	+ 0.07

Note. P = Primary school; S = Secondary school; U = University; O = Organisational; M = Methodical; C = Content; RN = Right/Norms; *SMD* = Standardized Mean Difference.

Table 3 presents a detailed overview of the studies' characteristics.

Fourteen effects were examined in university settings, nine in primary schools and 10 in secondary schools. Most of the studies focused on the effects on students' interests (16 studies). Of the effect sizes, 12 effects represent learner control in the methodical domain; nine effects relate to the control over the learning content and one effect to the organisational type of learner control. No effects were reported for the right/norm-related type of learner control. Mixed types of learner control are represented by 11 effects.

Differential effect. The fourth research question (Q2b) focuses on the differential effects of learner-controlled instruction on student motivation. The findings show various effects of learner-controlled instruction, depending on the specific type implemented in the classroom setting. Mixed results were found for learners' control over methodical decisions (five studies with $k = 12$ effects ranging from – 0.71 *SMD* to + 0.57 *SMD*, *Mdn* = + 0.15 *SMD*) and for organisational and content-related decisions that were offered simultaneously (one study with $k = 6$ effects ranging from – 0.81 *SMD* to + 0.45 *SMD*, *Mdn* = + 0.1 *SMD*). Overall positive effects were reported for the content-related type of learner control (five studies with $k = 9$ effects ranging from – 0.14 *SMD* to + 0.72 *SMD*, *Mdn* = + 0.3 *SMD*) and when learners' have methodical and content-related controlling rights at the same time (three studies with $k = 5$ effects ranging from – 0.6 *SMD* to + 1.02 *SMD*, *Mdn* = + 0.8 *SMD*). For the organisational (– 0.05 *SMD*) type only one effect reported. Effects of the right/norm-related type of learner control was not investigated by any study.

The differential analysis also shows that students in primary schools ($n = 3$ studies with $k = 9$ effects ranging from – 0.81 *SMD* to + 0.5 *SMD*, *Mdn* = + 0.25 *SMD*) and especially in secondary schools (five studies with $k = 10$ effects ranging from – 0.71 *SMD* to + 1.02 *SMD*, *Mdn* = + 0.66 *SMD*) benefit from learner-controlled instruction in their classrooms. Mixed findings were reported for learner control in university settings (five studies with $k = 14$ effects ranging from – 0.61 *SMD* to + 0.57 *SMD*, *Mdn* = + 0.11 *SMD*).

6. Discussion

Although increased student control over classroom instruction has been advocated for decades, only a few studies have investigated the effects of instructional practices on promoting student learning and motivation. This systematic review synthesises the effectiveness of learner-controlled instruction in naturally occurring classroom conditions. As learner control, we defined all instructional strategies through which learners gain a certain level of control over the events of instruction (Hannafin, 1984). For this study, four domains of learner control were derived from a theoretical perspective (Bohl & Kucharz, 2010) and taken into consideration: organisational, methodical, content-related and right/norm-related types. A detailed literature search found 20 relevant empirical studies, including 19 separate effects of learner-controlled instruction on student learning and 33 effects on student motivation. All studies conducted (quasi-)experiments under classroom conditions in schools or universities. Individual experiments outside the classroom or technology-assisted forms of learner control were excluded from this review. Thus, this review examined the effectiveness of learner-controlled instruction in naturally occurring and real-life classroom conditions which is relevant for high-leverage practices referring to student-oriented teaching in school or university (Grossman et al., 2021).

This synthesis suggests that learner-controlled instruction can positively affect students in real-life classroom settings. However, positive effects only refer to motivation-related outcomes (Q1a), whereas mixed effects were found for student learning (Q2a). Thus, the findings of this systematic review are only partly consistent with previous research on learner control. Concerning student academic achievement, the results of this study confirm the original hypothesis from Giaconia and Hedges (1982) that learner control has tendentially adverse effects on student learning. Certain theoretical strands from educational psychology might be useful to explain this effect, for instance, the *cognitive load theory,* which suggests that learning in highly complex environments overstrains the human brain's working memory (Kalyuga, 2007; Paas et al., 2003). For learning in the context of learner-controlled classroom environments, this means that students might have difficulties in learning, as they have to focus not only on the individual learning process but also, for example, on the organisation of their learning materials, their learning time, etc. This high cognitive workload is also a possible explanation for the lower learning outcomes of learner-controlled instruction compared to direct instructional designs in which the teacher makes the relevant instructional decisions (Engelmann & Carnine, 1982; Stockard et al., 2018). Furthermore, in most treatment conditions, learners had no (pre-)experience or routine with control of their learning, or were confronted with a level of learner control that they were not used to in their everyday learning, which could lead to an additional negative effect on the cognitive workload.

In contrast to the results from Giaconia and Hedges (1982), this review found an overall positive effect of learner control on student motivation. This result might be caused by the fact that in the study from Giaconia and Hedges (1982) the concept of motivation relates primarily to achievement-related motivational outcomes. In contrast, our concept of motivation is broader and includes aspects such as student engagement, perceived competence, self-efficacy as well as affective variables such as joy. It is to be expected that these affective-motivational components will be addressed more in the context of learner-controlled classroom environments than achievement motivation, which primarily relates to student outcomes (Schunk et al., 2010). Positive effects on motivation could also be explained by findings from traditional motivational theories (e.g., self-determination theory), which shows that social contexts that satisfy students' autonomy enhance students' motivational outcomes (Deci & Ryan, 2000). In line with traditional reinforcement-based learning theories (Skinner, 2014), it could also be assumed that learner control—as a new and student-oriented teaching approach—is likely to reinforce students' joy and interest.

Furthermore, this review reveals the differential effects of learner-controlled instruction on learning (Q1a) and motivation (Q1b). For student learning, content-related and organisational types of learner control especially show positive effects. In the case of student motivation, content-related control (in combination with methodical types of instructional control) seems to work best for student motivation. Double-edge effects were found for methodical-related types of learner control with minor adverse effects on student learning and small positive effects on student motivation. In sum, our findings indicate that students benefit from different instructionally relevant types of learner control. However, this result partly contradicts previous research findings, which suggest that thinking about instructionally relevant decisions diminishes students' motivation (Patall et al., 2008). The contradictory findings from our differential analysis might be explained by the naturalistic classroom conditions focused on the selected studies. In the context of classroom settings, students have no such time pressure as in individual and technology-based experiments and students could see the reactions/decisions of their classmates or even decide together. In such learning environments, the effort of learner-controlled instruction is lowered, while students are involved in higher social interaction which positively affects their motivation (Deci & Ryan, 2000; Schneider & Preckel, 2017).

The second primary finding of our differential analysis reveals that the implementation of learner-controlled instruction seems to have more significant effects on students in secondary schools than on those in primary schools or universities. In line with our previous statements, it might be that young children in particular are overwhelmed and overstrained by the broad range of freedoms—mostly offered for the first time—in their classroom. In contrast, older university students are more experienced in learning under autonomy-based conditions (Henri et al., 2018), so this effect might be less potent than for secondary school students, which have fewer opportunities to act autonomously in their everyday lessons (Hafen et al., 2012).

7. Limitations and future research

This review has some limitations. In disentangling the evidence on learner-controlled instruction in real-life and naturalistic classroom conditions, screening all studies made it evident that a strict research process is essential to gain information, for example, about the practical implementation. Unfortunately, the implementation of learner-controlled instruction is often insufficiently described within the method section of the studies. Therefore, only a small number of 20 studies met the criteria for a detailed synthesis. Hence, more empirical evidence is needed, especially for those types of learner control that have received little attention from educational research so far (e.g., right/norm-related types).

It should also be noted that the original studies were different in the sample (students from primary and secondary schools as well as from higher education), sample size, and primary field of research, so the separate effect sizes and especially the general effect size should be interpreted with caution (Seidel & Shavelson, 2007). Moreover, in most studies, it remains open whether and to what extent the size of effects is moderated by unmeasured confounding variables, such as teacher effects (Weiss, 2010). Hence, learner-controlled instruction can be one reason for the reported effects, but it is not clear whether it is the only one. Finally, one should also keep in mind that our findings could indicate double-edged effects, that is, positive effects on motivation and the opposite effect on learning (or reverse) at the same time. Hence, it is essential that future research simultaneously test the impact of learner-controlled instruction on learning and motivation.

In conclusion, we assume that more research is needed to create a reliable theory of learner-controlled instruction that differentially accounts for the specific conditions and design features of naturally occurred classrooms. Moreover, future research should also focus on other essential aspects, such as teacher guidance and scaffolding (Kiemer et al., 2018), autonomy-supportive classroom management (Alter & Haydon, 2017; Wallace et al., 2014), and professional training programmes for autonomy-supportive teachers (Reeve & Cheon, 2021). From this point of view, this systematic review is a steppingstone that encourages future studies to focus more on some of the outlined gaps regarding the role of learner control in educational research.

8. Practical implications

Enhancing student autonomy is essential to preparing learners for a future that requires self-regulation skills and critical thinking (Ghazali, 2020). Based on the findings of this review, it can be assumed that different opportunities for learner control in the hands of the students can enhance their feeling to be responsible for the learning (processes) and motivate them. Especially for motivation-related outcomes, learner control can foster positive effects, such as greater engagement, joy, and self-efficacy. However, without teacher guidance, learner-controlled classroom conditions are challenging for student achievement (e.g., text interpretation skills or scientific learning) (Furtak et al., 2012; Kirschner et al., 2006; Lazonder & Harmsen, 2016). Thus, in classroom practice, students should receive additional learning support from the teacher, for instance, due to cognitive activating learning materials, (meta-)cognitive teacher feedback, and adaptive learning plans (Bolhuis & Voeten, 2001; Reeve, 2016).

Furthermore, educational practitioners should be aware of the differential effects of introducing greater learner control in their classrooms. Decisions about what (combination of) types of learner control are implemented in the classroom have crucial implications for learning effectiveness. This review showed that organisational and content-related types of learner control have an overall positive effect on learning or motivation and can easily be handled by students in classroom practice (e.g., by providing different workplaces or tasks). However, the results also suggest specific interventions under which the negative effects of learner control occur, particularly when underachieving students were left alone and did not get additional support from the teacher (see Blumberg et al., 2004; Hardy et al., 2006). Thus, teachers in learner-controlled classrooms should have a broad repertoire of autonomy-supportive teaching techniques and scaffolding skills for different learners to adaptively assist students in light of newly gained freedoms.

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