Does Gradeless Learning Affect Students' Academic Performance?
A Study of Effects Over Time

Kjærgaard, Annemette; Buhl-Wiggers, Julie; Mikkelsen, Elisabeth Naima

Link to publication in CBS Research Portal

Does gradeless learning affect students' academic performance? A study of effects over time

Annemette Kjærgaard, Julie Buhl-Wiggers & Elisabeth Naima Mikkelsen

View supplementary material

Published online: 05 Jul 2023.

Submit your article to this journal

Article views: 98

View related articles

View Crossmark data

OPEN ACCESS   Check for updates

Does gradeless learning affect students' academic performance? A study of effects over time

Annemette Kjærgaard [a], Julie Buhl-Wiggers[b] and Elisabeth Naima Mikkelsen[c]

[a]Department of Management, Society and Communication, Copenhagen Business School, Frederiksberg, Denmark; [b]Department of Economics, Copenhagen Business School, Frederiksberg, Denmark; [c]Department of Organisation, Copenhagen Business School, Frederiksberg, Denmark

ABSTRACT
Many have suggested that performance grading may be a factor in the increasing number of students reporting having mental health issues, including feelings of stress. Gradeless learning has been shown to ease the pressure on students because it encourages a focus on learning rather than performance. Indeed, gradeless learning has been documented to benefit well-being, stress reduction, motivation, and learning approach, but its influence on academic performance requires more investigation. Drawing on a quantitative analysis, we empirically examine the effect of gradeless learning on a broad set of outcomes including well-being and stress, but focus specifically on students' later academic performance as measured by grades. Our findings reveal that gradeless learning can increase motivation and reduce surface learning but has no significant effect on students' later academic achievements. The study concludes that gradeless learning can provide a relevant alternative to grades if carefully designed.

Introduction

The first year of higher education can be one of life's most stressful times (Amirkhan, Bowers, and Logan 2019), but the growing numbers of students reporting challenges to their well-being and mental health have made this crucial period a particularly pressing concern for universities to address (see, e.g. Lisnyj et al. 2022; Walkington and Ommering 2022). Although these challenges have multiple causes, one stressor is the constant struggle to get grades good enough to be accepted by the most prestigious universities, selected for the most sought-after exchange programmes, or employed at the most attractive workplaces after graduation (Tannock 2017).

Grades were originally introduced to create a fair assessment system (see, e.g. Schinske and Tanner 2014) and have been shown to motivate students (Dobrow, Smith, and Posner 2011), but they have also been heavily criticized. Indeed, grades have been found to decrease intrinsic motivation (Deci, Koestner, and Ryan 2001; Kohn 1993), shift students' focus from learning to performance (Brilleslyper et al. 2012; Knowlton 2010; Lynch and Hennessy 2017), create unhealthy competition (Tannock 2017), induce stress and anxiety (Chamberlin, Yasué, and Chiang 2018; Khanna 2015), and to direct attention and efforts towards memorization and surface learning rather than deep

learning (Dobrow, Smith, and Posner 2011). As such, grading may hamper the achievement of desired learning outcomes, especially when it comes to transformative skills, such as critical reflexivity, which are based on dialogue, collaboration, and interaction rather than on a superficially learned set curriculum (Dyer and Hurd 2016; Walker et al. 2019). According to Lynch and Hennessy (2017, 1758) 'grades remain one of the great impediments to the promotion of transformative, flexible, and empowered graduates from university education'.

More recently, these critiques have renewed interest in the alternatives to letter- or number-based grades, including pass/fail systems and narrative evaluations, often referred to as 'gradeless learning' (Golding 2019; McMorran and Ragupathi 2020). In this paper, we adopt the term gradeless learning to refer to replacing traditional numerical or letter-based grades with pass/fail assessment and feedback. Although still limited, studies on this form of learning have often been designed to advance student learning (Danielewicz and Elbow 2009; Jackson and Marks 2016), to explore the impact of grades on students' approach to learning (Dahlgren et al. 2009), to reduce stress and increase well-being (Bloodgood et al. 2009; McMorran and Ragupathi 2020; McMorran, Ragupathi, and Luo 2017), and to increase interest and motivation (Hayek et al. 2015; White and Fantone 2010). While some studies have shown that gradeless learning can improve learning (see, e.g. Jackson and Marks 2016; Roberts and Dorstyn 2017), others have found mixed (Spring et al. 2011) or negative effects (E. Smith and Gorard 2005). A frequent concern is that the removal of grades diminishes student effort, motivation and subsequently learning (McMorran and Ragupathi 2020; Spring et al. 2011). Hence, the relationship between gradeless learning and academic achievement remains an unresolved matter but nevertheless important for teachers and institutions when considering implementing gradeless learning.

We fully support the aim of easing students' stress and increasing their well-being to create a conducive learning environment but want to know more about the effect of gradeless learning on academic performance. Universities looking to institute gradeless learning need to be aware of the negative as well as the positive effects on a broader set of outcomes, including academic performance. Such awareness could provide schools with a better decision-making basis that considers how best to use gradeless learning and, equally importantly, how to support students when gradeless learning systems are designed. In this article we therefore aim to systematically explore the effects of gradeless learning on student academic performance, pursuing the following research question: What effects does a full first year of gradeless learning have on student academic performance and (how long) do these effects last?

This study primarily focuses on effects on later academic performance, but we also scrutinize other effects of the gradeless learning experience, such as students' approach to learning, their stress levels, and their motivations, all of which may factor in their learning experience and performance.

From grades to gradeless – literature review

The use of grades became important in the late nineteenth and early twentieth century as the number of higher education institutions grew and coordination between them became more important (Schinske and Tanner 2014, 160). Although not unknown before this time, grades from different institutions had been fairly incompatible, with little consistency in practice and meaning (J. K. Smith and Smith 2019). To ensure compatibility and minimize subjectivity across institutions, they began distributing grades according to a normal curve, which was seen as an adequate solution based on the assumption that student aptitudes would follow such a curve (Schinske and Tanner 2014). This 'norm-referenced' grading practice (Brookhart 2004) has since been highly debated, because it dissociates grades from content knowledge and learning, for example, when 'A' students in different classes are not actually at the same academic level. The practice has also been criticized as forcing students to compete with each other even when the differences between them are slight (Schinske and Tanner 2014). These critiques have thus led to an increase in 'criterion-referenced'

grading (Brookhart 2004), whereby grades reflect students' achievement of learning outcomes. This form of grading shifted the practice from being 'based on relative standing to be[ing] based on absolute levels of achievement, aligning with Bloom's description of 'learning for mastery' (1968) and arguments that all or nearly all students could succeed at very high levels' (Guberman 2021, 87). However, when specific criteria are applied to support student learning, students are more likely to meet these criteria and receive higher grades, which could lead to grade inflation (Guberman 2021). In short, grading systems have remained contentious, and discussions on the fairness of grades – both regarding aptitude levels and classroom performance – have grown alongside the critical voices declaring the potential psychological damage to students (Guberman 2021; Schinske and Tanner 2014).

Some support the notion of grades' motivating effect (Dobrow, Smith, and Posner 2011; Pulfrey, Buchs, and Butera 2011), whereas others criticize grades for shifting students' focus from an intrinsic motivation for learning to an extrinsic motivation for rewards (Butler 1988; Deci, Koestner, and Ryan 2001; Pulfrey, Darnon, and Butera 2013). According to critics, grades thus lead students to focus on performance rather than learning (Dobrow, Smith, and Posner 2011). If deep learning and getting good grades were synonymous, the problem would not exist (Brilleslyper et al. 2012, 411), but as Stommel (2020, n.p.) quoting Kohn noted, 'research shows three reliable effects when students are graded: They tend to think less deeply, avoid taking risks, and lose interest in learning itself.' When students perceive grades as the primary outcome of education, they pursue performance objectives rather than learning objectives, which may lead to negative outcomes for the learning environment and demotivate individuals who fail to obtain good grades (Beatty 2004). Dobrow, Smith, and Posner (2011) have termed this phenomenon 'the grading paradox'.

Frustrations about these effects of grading have led teachers from various fields to advocate rethinking how students are assessed. Some scholars have proposed that grades be eliminated from education entirely (Kohn 1993; Tannock 2017); others have experimented with such less drastic alternatives as grading without points (Brilleslyper et al. 2012) or withholding grades (Jackson and Marks 2016).

Gradeless learning

Research on fully gradeless learning is generally scarce, possibly because educational systems where grades are an essential component have relatively similar assessment policies (Klapp 2015). In a recent scoping review of reduced grading (Normann, Sandvik, and Fjørtoft 2022), 16 articles were found to address this topic in higher education, which shows that the field remains narrow. A recurring theme in the gradeless learning literature is student motivation. Comparing academic motivation between institutions with different grading systems, Chamberlin, Yasué, and Andrea Chiang (2018) found that narrative evaluation supported autonomy, competence, and relatedness. Other studies support these results, finding that pass/fail and narrative evaluation promote academic motivation (Bloodgood et al. 2009; Guberman 2021; White and Fantone 2010). Focusing specifically on the first year of university, McMorran, Ragupathi, and Luo (2017) found that a gradeless system eased students' transition into university and intrinsically fostered their 'love of learning' (362). Similarly, students have been shown to be more motivated to collaborate when not perceiving each other as competitors to the degree they would have if graded (Hayek et al. 2015; Kjærgaard, Mikkelsen, and Buhl-Wiggers 2022; White and Fantone 2010).

Gradeless learning has also been found to reduce stress and increase students' well-being (see e.g. Bloodgood et al. 2009; Matthews and Noyes 2016; McMorran and Ragupathi 2020; McMorran, Ragupathi, and Luo 2017). A review by Spring et al. (2011) showed that enhanced student well-being compensated for a slightly lower academic performance among a group of students receiving pass/fail grades. Moreover, students who believe that gradeless learning (pass/fail) reduces the stress associated with thesis writing prefer this system to letter- or number-based grading (Nyström 2018).

A few studies have investigated how changing students' approach to learning can induce a deeper understanding. For example, Brilleslyper et al. (2012) examined contract grading in students guaranteed a B if they fulfilled the contract terms, thus showing how students became more reflexive on feedback and took more control of the learning process when it was decoupled from grades. Ragupathi (2022), who used ethnographic methods to study students' educational beliefs about learning and assessment, found that the gradeless environment was conducive to student learning and therefore a step towards a more democratic university ideology. These findings have been echoed in studies by Dahlgren et al. (2009) and Altahawi et al. (2012), both of which indicated that from a student perspective gradeless systems catalyse reflexive behaviours. Finally, gradeless learning was found to make students less averse to risk and more courageous about taking courses outside their immediate comfort zones (McMorran, Ragupathi, and Luo 2017). This research has shown generally positive results with regard to student motivation, well-being, and learning, but less research has been done on how gradeless learning affects students' later academic performance.

Gradeless learning and academic performance

Few studies have focused directly on the relationship between gradeless learning and academic performance. Based on a natural experiment stemming from a Swedish policy decision to make grading optional, one of these studies was able to compare larger groups of students ($n = 8,558$) (Klapp 2015). Although carried out in primary school, we have included it here precisely because of the substantive number of students it studied and its robust explanatory power. The results showed that, measured by secondary school grades, later academic performance was negatively affected for students characterized as lower achievers in primary school and slightly positively affected for those characterized as higher achievers.

The impacts of using graded versus ungraded quizzes were compared in a study by Khanna (2015), who found that students receiving ungraded quizzes performed better on subsequent tests than those whose quizzes were graded. The results of a similar comparison between graded and ungraded assignments showed a slightly positive but not significant difference between students' performances in the two groups (Armstrong 2010), whereas a third study comparing different cohorts of students in the same course showed that a combination of feedback and withholding of grades significantly raised subsequent grades (Jackson and Marks 2016). Not all studies have been equally positive: Spring et al. (2011) found the performance of psychology students receiving pass/fail grades to be lower than those assessed with multi-level grading, and other studies have reported no significant difference between graded and gradeless learning (Rohe et al. 2006; White and Fantone 2010). In the rest of the paper, we investigate and report on how gradeless learning impacts students' later academic performance.

Methods

Setting and study population

Our study follows the implementation of gradeless learning and assessment in the first year of a bachelor's programme in Business and Psychology at a large business school in Denmark. The programme admits between 150 and 160 students per year, generally based on their secondary school grade point average (GPA), which for this programme needs to be high. In the Danish context, university admission is very closely related to GPA, which can lead students to feel a pressure to perform during secondary school and thus, some have contended, to experience stress and a decrease in well-being. Business school students are generally more instrumental and goal-oriented than students studying other disciplines (see, e.g. Parks-Leduc, Mulligan, and Rutherford 2020; Sutherland et al. 2018), for which reason they may be more positive towards grades. However, the students in the Business and Psychology programme are less so than students in the Finance or Economics

programmes. Seeking to strengthen the programme's study culture, in 2017 students on the study board called for a stronger focus on well-being, particularly in the first year of study, in order to strengthen the programme's study culture. Despite the aim of enhancing student well-being, an important parameter for success was ensuring that the intervention did not lead to a decrease in learning outcomes for the students.

Acting on this request, the programme management sought institutional support and designed an intervention that started in autumn 2018. All first-year grades were substituted with pass/fail assessments and written and oral feedback from teachers and student peers. All teachers giving first-year modules were invited to workshops aimed to help them provide feedback to students and to discuss their course transformation with a learning consultant. The management further held regular meetings with teachers to discuss challenges and progress and to ensure that administrative obstacles were removed. Programme learning outcomes remained the same as they were before the intervention.

To help students understand how well they were doing, teachers generally gave students feedback on assignments submitted during the course (formative feedback). For feedback on how well they had met the overall learning objectives (summative feedback), teachers provided written statements, or teachers and peers gave feedback during discussion forums for that purpose. These forums have commonly included follow-up questions asked by teachers and peer discussions about possible interpretations.

The first year of the Business and Psychology programme is dedicated to courses in economics (microeconomics, behavioural economics, and accounting), psychology (personality, cognitive, and social psychology), organization theory, and quantitative methods. Students work in small groups of 4–6, which are shuffled twice during the first year. Our study followed two consecutive cohorts admitted in 2018 and 2019. We have referred to them as the classes of 2021 and 2022, based on their expected year of graduation. We have further included data from the cohort admitted before the intervention in 2017, as a comparison group. We have referred to this class as the class of 2020. Accordingly, our analytical approach involved comparing outcomes of cohorts either affected or unaffected by gradeless learning, based on the assumption that the cohorts were otherwise comparable. We were primarily interested in the effect on academic achievement that involves medium- and long-term outcomes, as students only first received grades at the end of the third semester. To explore the immediate effects of gradeless learning we also included survey responses on student well-being, learning approach, and motivation measured at the end of the gradeless first year.

All three cohorts were largely comparable in terms of observable characteristics; see Table 1. The average age was between 20.3 and 21.6, 76–78% were female, 93–97% were from Denmark, and their admission GPAs lay between 9.3 and 10.1, which is 2–3 points above the university average on a 7-point scale going from −3 to 12 (including the grades −3, 0, 2, 4, 7, 10, and 12),[1] thus

Table 1. Descriptive statistics.

	Control Class of 2020 (N = 122) (1) Mean/SE	Treatment Class of 2021 (N = 121) (2) Mean/SE	Treatment Class of 2022 (N = 130) (3) Mean/SE	Difference (1)–(2)	Difference (1)–(3)	Difference (2)–(3)
Age	21.410 (0.240)	21.636 (0.216)	20.223 (0.114)	−0.227	1.187***	1.413***
Female	.795 (0.037)	.760 (0.039)	.769 (0.037)	0.035	0.026	−0.009
Danish	.959 (0.018)	.942 (0.021)	.969 (0.015)	0.017	−0.010	−0.027
Non-Danish	.041 (.018)	.058 (0.021)	.031 (0.015)	−0.017	0.010	0.027
High school GPA	9.325 (0.105)	9.611 (0.106)	10.158 (0.110)	−0.285*	−0.832***	−0.547***

Note. Standard errors in brackets. ***, **, and * indicate significance at the 1, 5, and 10 percent critical levels.

classifying these students as high achievers. As the admission requirements increased over time, we also noted a corresponding increase in incoming students' high school GPAs. Moreover, members of the class of 2022 were on average one year younger than the previous cohorts.

Sample and data collection

We obtained the data from two sources: (1) administrative data about attrition, grades, and demographic characteristics and (2) survey data on students' well-being, study approach, and motivation. We started collecting data in May 2018, using a survey of the class of 2020 as a basis for comparison; its response rate was 23%. A year later, we then distributed the same survey to the class of 2021, with the response rate for this one being 47%.[2] The difference in response rates meant that about twice as many students in the treatment group responded to the survey as in the control group. Apart from the differences also present in the full sample, we found no significant differences in the baseline characteristics of the three groups of students responding to the surveys (see Appendix Table 1). Figure 1 presents an overview of the timing of both the treatment and the data collection. As the intervention targeted the first year of study, we distributed the survey to students only after the first year and not in subsequent years. Accordingly, we have measures on student well-being, learning strategies, and motivation at one point in time (after the second semester) and measures on academic achievement at three points in time.

Measures

The outcome of main interest to our study is the academic performance measured at different points during the bachelor's programme. This process gave us three measures of academic performance: GPA from the third semester, which was the first semester after the grade-free first year; GPA from the fourth semester; and the final grade from the bachelor's thesis. The GPAs consist of the final exams of the mandatory courses during the two semesters. All grades were measured on a 7-point scale. We measure academic performance by exam scores as a proxy for student learning. Recognizing that exam scores are imperfect proxies for student learning, they still remain the best proxy available for assessing all students across pre- and post-treatment cohorts. In addition to academic performance, we also looked at the learning approach, motivation, and well-being. To measure the learning approach, we used a validated translation of the Biggs Study Approach Questionnaire (Biggs, Kember, and Leung 2001; Lassesen 2011). This instrument measures four subscales:
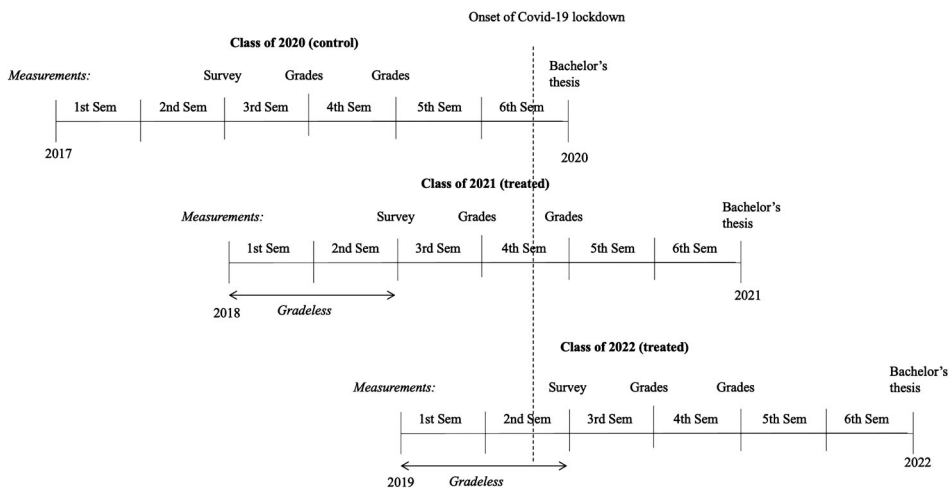
Figure 1. Overview of data collection.

deep motive, deep strategy, surface motive, and surface strategy. Motivation captures both intrinsic and extrinsic motivations and was measured by means of a validated adaption of the Motivated Strategies for Learning Questionnaire (Nielsen 2018; Pintrich and Others 1991). Well-being was proxied by perceived stress levels, social integration, and feelings of loneliness. We measured stress levels by means of a validated translation of the Perceived Stress Scale (Cohen, Kamarck, and Mermelstein 1983; Eskildsen et al. 2015) and social integration by asking three questions, each based on a 5-point Likert scale and then combined into an index. The Cronbach's alpha for this scale was 0.86, which suggests that the items have relatively high internal consistency (see Appendix Table 2 for an overview of the specific questions and reliability). To measure loneliness, we used the Three-Item Loneliness Scale (T-ILS) (Hughes et al. 2004). All outcomes were measured in standard deviations such that we standardized each outcome by subtracting the control group mean and dividing by the standard deviation. See Appendix Table 3 for a list of all survey questions.

To increase precision in the estimates, we included standard covariates of age, gender, high school GPA, and geographical origin as control variables. The gender variable is a dummy, with females coded as one and males as zero. The variable for nationality was a categorical variable with two categories: Danish and non-Danish.

Analytical procedure

The main predictor variable was an indicator showing whether students were exposed to gradeless learning or not. For the two treatment cohorts, we separately assessed the relationship between gradeless learning and our outcomes of interest in a multivariate regression framework. In addition to exposure to gradeless learning, we expected other individual factors, such as demographics and prior academic achievement, to determine the outcomes. To account for these multiple sources of variation, we set the following empirical specification:

$$y_{ic} = \beta_0 + \beta_1 T_c + \mathbf{X}'_i \beta_2 + \varepsilon_{ic} \tag{1}$$

where i indexes the individual and c the cohort to which the individual belongs; y_{ic} is our outcome of interest; T is a dummy variable with a value of 1 for individuals in the gradeless programme and 0 for those outside of it; $\mathbf{X}$ is a vector of control variables, including gender, age, nationality, and prior academic achievement; ε_{ic} is the residual error, which we assume to be i.i.d. To estimate the above specification, we relied on ordinary least squares (OLS) methods. Our coefficient of interest, β_1, showed the effect of being exposed to a gradeless first year.

In addition to the average effect, we explored whether gradeless learning had a differential effect between males and females and between students with different levels of prior academic achievement. Previous literature has found that females tend to shy away from competition (Niederle and Vesterlund 2010) and that assessment based on teacher assessment favours females while assessments based on exams tend to favour males (Angelo and Reis 2021). Considering the existing gender disparity in exam-based assessments, we anticipated that gradeless learning would have a more pronounced effect on females compared to males. More formally, we interact a dummy for being female with the treatment variable as follows:

$$y_{ic} = \alpha_0 + \alpha_1 T_c * F + \mathbf{X}'_i \alpha_2 + \omega_{ic} \tag{2}$$

where F is a dummy variable indicating whether the student is female. The coefficient α_1 measures the extent to which gradeless learning affected males and females differently.

Previous literature has also found that grading affects high- and low-achieving students differently (Klapp 2015). Where low-achieving students tend to be negatively affected by grading, high-achieving students tend to benefit. To explore if such differences exist for gradeless learning we interact student's high school GPA with the treatment variable as follows:

$$y_{ic} = \delta_0 + \delta_1 T_c * A + \mathbf{X}'_i \delta_2 + \epsilon_{ic} \tag{3}$$

where A is the student's high school GPA. The coefficient δ_1 measures the extent to which low- and high-achieving students are differentially affected by gradeless learning.

Results

The results are structured according to the bachelor's programme timeline, starting with the effects after the first year (well-being, learning strategies, and motivation), followed by the effects on grades in the third and fourth semesters, and finally the effects on the final bachelor's thesis grade.

Table 2 presents the results we obtained from estimating Equation (1), using learning approach, motivation, and well-being as dependent variables. For these variables, we focused on the effect on the class of 2021, as the class of 2022 responses were profoundly affected by the Covid-19 pandemic (see Figure 1 for the timing of the survey).

Panel A in Table 2 presents the results concerning the effects on stress, loneliness, and social integration. Although the estimated coefficients have the expected sign, all are statistically insignificant, thus suggesting that gradeless learning did not affect student well-being in a statistically significant way.

Panel B in Table 2 presents the effects of gradeless learning on students' learning approach, showing that students in the gradeless programme were significantly less likely to have a surface-strategy approach than students not exposed to gradeless learning (b = −.833; p < .000). Students exposed to gradeless learning were thus less likely to employ a learning approach based on rote learning than students not exposed to gradeless learning.

Panel C in Table 2 shows whether gradeless learning affected students' motivation. This is where we see that students in the gradeless programme were significantly more motivated (both intrinsically and extrinsically) than students not exposed to gradeless learning (b = .741; p < .001) and (b = .686; p < .001). This confirms findings from previous literature (Chamberlin, Yasué, and Chiang 2018; White and Fantone 2010).

Turning to the question of whether gradeless learning affected students' academic performance, we considered the classes of both 2021 and 2022. Table 3 presents the results from the third and fourth semesters and shows no statistically significant effects of gradeless learning on GPA. For the bachelor's thesis, no difference was observed between the three cohorts. This means that the

Table 2. Effects on well-being, learning strategy, and motivation.

	(1)	(2)	(3)	(4)
Panel A: Student well-being				
	Stress	Loneliness	Social Integration	
Gradeless	−0.218	−0.123	0.291	
	(0.238)	(0.239)	(0.268)	
Observations	89	89	89	
Controls	YES	YES	YES	
Panel B: Learning strategy (Biggs)				
	Deep learning		Surface learning	
	Motive	Strategic	Motive	Strategic
Gradeless	0.173	−0.161	0.213	−0.833***
	(0.233)	(0.252)	(0.264)	(0.234)
Observations	89	89	89	89
Controls	YES	YES	YES	YES
Panel C: Motivation				
	Intrinsic	Extrinsic		
Gradeless	0.741***	0.686***		
	(0.237)	(0.227)		
Observations	89	89		
Controls	YES	YES		

Note. These results are based on survey answers from students in the class of 2020 (control) and the class of 2021 (treatment). Standard errors in parentheses. All regressions include the following controls: age, gender, geographic origin, and high school GPA. ***, **, and * indicate significance at the 1, 5, and 10 percent critical levels, respectively.

Table 3. Effects on academic achievement.

| | (1) | (2) | (3) | (4) | (5) | (6) |
| | Third semester | | Fourth semester | | Bachelor's thesis | |
	Class of 2021	Class of 2022	Class of 2021	Class of 2022	Class of 2021	Class of 2022
Gradeless	0.164	0.132	−0.198	−0.163	0.018	0.041
	(0.111)	(0.124)	(0.122)	(0.148)	(0.139)	(0.154)
Observations	243	252	243	252	221	232
Controls	YES	YES	YES	YES	YES	YES

Note. Standard errors in parentheses. All regressions include the following controls: age, gender, geographic origin, and high school GPA. ***, **, and * indicate significance at the 1, 5, and 10 percent critical levels, respectively.

change in study approach observed by the end of the second semester did not on average transform into significant effects on subsequent exam grades.

To explore the heterogeneous effects of gradeless learning on academic achievement, we focused on two dimensions: prior academic achievement (measured as high school GPA) and gender. Table 4 presents the results we obtained from estimating Equation (2), where we interacted the indicator for gradeless learning with an indicator for being female. Table 4 shows no clear tendency of differential effects between males and females. For the class of 2022 we see a negative effect in the fourth semester for males. However, this semester was also profoundly affected by Covid-19, for which reason we have relied more heavily on the results for the class of 2021.

Regarding the heterogeneous effects of prior achievement, we see a tendency for students with higher prior achievement to be negatively affected by gradeless learning (please see Table 5).

In sum, the findings indicate that students in the gradeless programme are more intrinsically motivated and less likely to employ a surface-strategy learning approach. We find no effect on well-being, which is somewhat surprising considering the contrasting findings in previous literature. Moreover, no statistically significant effects have been found on subsequent exams, nor have we found differences in long-term academic performance. Finally, we see a tendency for gradeless learning to be less effective for high-achieving students, which Klapp (2015) also found.

Discussion

In relation to academic performance, previous studies of gradeless learning in higher education have produced inconsistent results in relation to academic performance. The present study was premised on the idea that systematically investigating the effects in relation to academic performance measured as grades might clarify this relationship and thereby contribute new knowledge to teachers and institutions considering a shift to gradeless learning. Using the proxy of exam grades to measure the effect of gradeless learning on students' achievement, our study shows that gradeless learning does not lower student achievement. This concern has been raised by faculty in previous

Table 4. Effects on academic achievement by gender.

| | (1) | (2) | (3) | (4) | (5) | (6) |
| | Third semester | | Fourth semester | | Bachelor's thesis | |
	Class of 2021	Class of 2022	Class of 2021	Class of 2022	Class of 2021	Class of 2022
Gradeless	0.340	0.102	−0.239	−0.790**	−0.038	−0.577
	(0.232)	(0.257)	(0.257)	(0.324)	(0.368)	(0.399)
Female	0.008	0.187	−0.088	−0.054	0.008	0.054
	(0.292)	(0.191)	(0.206)	(0.211)	(0.292)	(0.293)
Gradeless*Female	−0.229	0.039	0.052	0.815**	0.071	0.785*
	(0.264)	(0.287)	(0.292)	(0.349)	(0.392)	(0.423)
Observations	243	252	243	252	221	232
Controls	YES	YES	YES	YES	YES	YES

Note. Standard errors in parentheses. All regressions include the following controls: age, high school GPA, and geographic origin. ***, **, and * indicate significance at the 1, 5, and 10 percent critical levels, respectively.

Table 5. Effects on Academic Achievement by High School GPA.

	(1)	(2)	(3)	(4)	(5)	(6)
	Third semester		Fourth semester		Bachelor's thesis	
	Class of 2021	Class of 2022	Class of 2021	Class of 2022	Class of 2021	Class of 2022
Gradeless	0.112	0.129	−0.202	−0.166	0.008	0.040
	(0.112)	(0.118)	(0.123)	(0.141)	(0.139)	(0.155)
High school GPA	0.298***	0.304***	0.311***	0.331***	0.090	0.100
	(0.108)	(0.107)	(0.057)	(0.057)	(0.064)	(0.069)
Gradeless*High school GPA	−0.234*	−0.140**	−0.018	−0.145***	−0.053	−0.028
	(0.123)	(0.062)	(0.091)	(0.049)	(0.101)	(0.050)
Observations	243	252	243	252	221	232
Controls	YES	YES	YES	YES	YES	YES

Note. Standard errors in parentheses. All regressions include the following controls: age, geographic origin, and gender. ***, **, and * indicate significance at the 1, 5, and 10 percent critical levels, respectively.

studies (McMorran and Ragupathi 2020) as well as in our own institution. As our results show, gradeless learning does not decrease long-term academic performance as measured by exam-grades on average. We also found that gradeless learning increases students' motivation (intrinsic as well as extrinsic) and reduces strategic surface learning, which indicates that gradeless learning has the potential to change students' learning approach, as aspired for in the literature. Contrary to expectation, our findings did not replicate previous results regarding a reduction in stress and an increase in well-being among students in gradeless learning (see e.g. Matthews and Noyes 2016; McMorran and Ragupathi 2020). Furthermore, we can only speculate that the lack of effect may derive from new feelings of stress that might arise directly because students unused to not receiving grades may feel uncertain about their performance. A depletion of grades may also give rise to an identity crisis in students (Kjærgaard, Mikkelsen, and Buhl-Wiggers 2022). This indicates that gradeless learning must be carefully designed, or its benefits will fail to be reaped in full.

A first point of discussion is how to address students' often long-term preoccupation with grades, as these are often the ticket to university and strongly drive (extrinsic) motivation (Dobrow, Smith, and Posner 2011). When students have successfully navigated in a grade-centric education system to get as far, eliminating grades from their leaning may have consequences that run counter to the intended aim (Jackson and Marks 2016) and instead result in new forms of anxiety or stress (Kjærgaard, Mikkelsen, and Buhl-Wiggers 2022; McMorran and Ragupathi 2020). For this reason, critical consideration must be given to how gradeless learning and teaching are carried out. We suggest that future research include systematic observations of classroom interaction as well as give voice to students by inquiring into their perceptions and experiences of gradeless learning which only few studies have done (see Ragupathi 2022). Moreover, research explicating the heterogeneous effects of gradeless learning ought to investigate whether gradeless learning benefits some specific groups of students over others, as our findings indicate in regard to high-achieving students. Our study examined first year students on the assumption that they would benefit from focusing on learning rather than performance during the period in which they become academically socialized into university. However, other groups of learners may reap even greater benefits from a discussion of whether grades are relevant in executive education or whether they reduce the incentive to learn from peers or participate in experiential learning that includes challenging one's own practices or even failing.

Second, our study supports previous findings that gradeless learning has the potential to shift students' learning approach away from surface learning and thus undergird 'requirements often looked for in university students like self-discipline, independence, and an openness to experience resulting in intellectual curiosity, creativity and an open attitude' (Tippin, Lafreniere, and Page 2012, 59). This indicates that gradeless learning may play an important role in developing students' soft skills, which the use of grades less easily serves to measure or assess in disciplinary knowledge terms (Chan and Luk 2022). From previous studies of gradeless learning we know that students

feel more comfortable collaborating with others in a gradeless learning setting (Kjærgaard, Mikkelsen, and Buhl-Wiggers 2022) and that it positively influences students' willingness to explore new opportunities (Hayek et al. 2015), which points to how gradeless learning can support students in developing their generic skills. Although this study aimed to focus on the effect of gradeless learning on students' later performance in exams related to disciplinary knowledge, we acknowledge that the impact of gradeless learning on soft skills or 'holistic competences' (Chan and Yeung 2021) is also an important area for research, as such competences are important for students graduating into an increasingly globalized and unpredictable world (Hendry 2006; Longmore, Grant, and Golnaraghi 2018; Oliver and Jorre de St Jorre 2018). We therefore encourage future studies to be done on the effects of gradeless learning on a broader set of learning outcomes, as such research will help to inform future educational strategies, including for designing assessments of holistic competences, which grade-based, formal assessments may have difficulty determining (Chan and Luk 2022).

A third point for discussion is how teachers might engage in gradeless learning in ways that consider the need to train faculty about the effects of grades and alternatives to traditional grading and feedback. Gradeless learning is often introduced in connection with a shift to innovative instructional strategies that aim for more interactive and student-focused teaching and less lecturing and teaching for the exam (Knowlton 2010). However, these new pedagogical forms can be challenging for teachers to adopt or sustain because they may not feel sufficiently supported by shorter faculty development courses or are confronted with rules and regulations they are unsure how to meet or challenge. Without support that extends beyond individual front-runners' interventions, 'faculty members often become uncomfortable with the strategy and therefore regress toward a 'teach as I was taught' framework' (Knowlton 2010, 70), which can limit the effects of the changes.

Finally, grades and gradeless learning should be considered in a broader societal context. Although initially meant to serve various pedagogical purposes (Schinske and Tanner 2014), due to more recent reforms, grades have been emphasized as 'useful tools in an organizational rather than pedagogical enterprise … to facilitate movement, communication, and coordination' (Schneider and Hutt 2014). This poses the question of what the purpose of grading in educational settings is and should be, and whether better alternatives to existing grading forms are possible. In the current political debate (see, e.g. Stommel 2020; 2022) grades have been suggested as contributing to the growing mental health problem among young adults. Accordingly, gradeless learning has been discussed as a potential means of easing the pressure on children and young adults, as it could foster less competition and a greater focus on learning than performance. As previous studies have shown (Dobrow, Smith, and Posner 2011), however, altering students' learning attitude and behaviour requires acknowledging the thorny relationship between grades and motivation, a relationship that includes the lower likelihood that students will carry out their studies without grades (cf. McMorran and Ragupathi 2020) as well as the tendency among students to let grades define who they are (Kjærgaard, Mikkelsen, and Buhl-Wiggers 2022). Whereas the former requires giving students support in adjusting to the new expectations posed in gradeless learning and thus in finding new motivations without grades, the latter requires a more profound shift away from predominantly defining young adults by their grade achievements. Students in our study were accustomed to being graded during their secondary education and returned after the gradeless first year to a fully graded education for the remainder of their university studies. This means that the gradeless period was only a brief respite from a grade-centric society, which might have undermined the potential long-term effects of using the gradeless approach to learning and assessment. As long as grades continue to open or close doors to higher social status and careers, they will remain a core metric that influences how young adults see themselves and others.

Limitations

As the results of this study are based on a single study programme that attracts high-achieving students, we do not know whether the results are generalizable to other contexts with different types of

students and in different cultural settings. However, although our results might not be generalizable to an overall body of university students, our study setting has features common to many university settings and in particular, to introductory courses during the first year. We hope to have inspired others to carry out similar studies to compare results with our findings. This limitation relates to external validity, but some additional limitations relate to internal validity. First, the response rate to our survey questions varied from 23% (class of 2020) to 47% (class of 2021), a difference that could raise concerns about differential attrition between the two cohorts. Second, it is important to recognize that exam scores are only imperfect proxies for learning, and we acknowledge that other proxies could have provided relevant and valuable insights that extend beyond the scope of exam scores alone. Third, although no observable differences were found between non-responders in the two cohorts, there might be unobservable differences for which we have not accounted. Finally, our last round of data collection coincided with the Covid-19 pandemic, which might have influenced the responses.

Conclusion

In conclusion, our study shows that gradeless learning can reduce surface learning and enhance students' motivation without negatively impacting later academic performance. As such, gradeless learning has the potential to support the development of skills important in university education. Accordingly, we encourage future research into how best to use gradeless learning in an educational setting strongly influenced by quantification and performance indicators.

Notes

1. On the European letter grade scale, which differs from the American, 12 is equivalent to A, 10 to B, 7 to C, 4 to D, 02 to E, 00 to FX, and −3 to F.
2. We also distributed the survey to the class of 2022 in May 2020. However, due to Covid-19, the answers are not comparable to previous cohorts and thus cannot be used in the analysis.

Disclosure statement

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

ORCID

Annemette Kjærgaard 🔴 http://orcid.org/0000-0002-7017-9283

References

Altahawi, Faysal, Bryan A. Sisk, Stacey L. Poloskey, Caitlin Hicks, and Elaine F. Dannefer. 2012. "Student Perspectives on Assessment: Experience in a Competency-Based Portfolio System." *Medical Teacher* 34 (3): 221–25. https://doi.org/10.3109/0142159X.2012.652243.

Amirkhan, James H., Graham K. Bowers, and Christina Logan. 2019. "Applying Stress Theory to Higher Education: Lessons from a Study of First-Year Students." *Studies in Higher Education* 45: 2231–44. https://doi.org/10.1080/03075079.2019.1601692.

Angelo, Catarina, and Ana Balcão Reis. 2021. "Gender Gaps in Different Grading Systems." *Education Economics* 29 (1): 105–19. https://doi.org/10.1080/09645292.2020.1853681.

Armstrong, Kimberly M. 2010. "Fluency, Accuracy, and Complexity in Graded and Ungraded Writing." *Foreign Language Annals* 43 (4): 690–702. https://doi.org/10.1111/j.1944-9720.2010.01109.x.

Beatty, Joy. 2004. "Grades as Money and the Role of the Market Metaphor in Management Education." *Academy of Management Learning & Education* 3 (2): 187–96. https://doi.org/10.5465/amle.2004.13500516

Biggs, John, David Kember, and Doris Y. P. Leung. 2001. "The Revised Two-Factor Study Process Questionnaire: R-SPQ-2F." *British Journal of Educational Psychology* 71 (1): 133–49. https://doi.org/10.1348/000709901158433.

Bloodgood, Robert A., Jerry G. Short, John M. Jackson, and James R. Martindale. 2009. "A Change to Pass/Fail Grading in the First Two Years at One Medical School Results in Improved Psychological Well-Being." *Academic Medicine* 84 (5): 655–62. https://doi.org/10.1097/ACM.0b013e31819f6d78.

Brilleslyper, Mike, Michelle Ghrist, Trae Holcomb, Beth Schaubroeck, Bradley Warner, and Scott Williams. 2012. "What's The Point? The Benefits of Grading Without Points." *PRIMUS* 22 (5): 411–27. https://doi.org/10.1080/10511970.2011.571346.

Brookhart, S. 2004. *Grading*. Upper Saddle River, NJ: Pearson Education.

Butler, Ruth. 1988. "Enhancing and Undermining Intrinsic Motivation: The Effects of Task-Involving and Ego-Involving Evaluation on Interest and Performance." *British Journal of Educational Psychology* 58 (1): 1–14. https://doi.org/10.1111/j.2044-8279.1988.tb00874.x.

Chamberlin, Kelsey, Maï Yasué, and I-Chant Andrea Chiang. 2018. "The Impact of Grades on Student Motivation." *Active Learning in Higher Education* 24: 109–24. https://doi.org/10.1177/1469787418819728.

Chan, Cecilia K. Y., and Lillian Y. Y. Luk. 2022. "Going 'Grade-Free'? – Teachers' and Students' Perceived Value and Grading Preferences for Holistic Competency Assessment." *Higher Education Research & Development* 41 (3): 647–64. https://doi.org/10.1080/07294360.2021.1877628.

Chan, Cecilia K. Y., and Nai Chi Jonathan Yeung. 2021. "To Assess or Not to Assess Holistic Competencies – Student Perspectives in Hong Kong." *Studies in Educational Evaluation* 68 (March): 100984. https://doi.org/10.1016/j.stueduc.2021.100984.

Cohen, Sheldon, Tom Kamarck, and Robin Mermelstein. 1983. "A Global Measure of Perceived Stress." *Journal of Health and Social Behavior* 24 (4): 385–96. https://doi.org/10.2307/2136404.

Dahlgren, Lars Owe, Andreas Fejes, Madeleine Abrandt-Dahlgren, and Nils Trowald. 2009. "Grading Systems, Features of Assessment and Students' Approaches to Learning." *Teaching in Higher Education* 14 (2): 185–94. https://doi.org/10.1080/13562510902757260.

Danielewicz, Jane, and Peter Elbow. 2009. "A Unilateral Grading Contract to Improve Learning and Teaching." *College Composition and Communication* 61 (2): 244–68.

Deci, Edward L., Richard Koestner, and Richard M. Ryan. 2001. "Extrinsic Rewards and Intrinsic Motivation in Education: Reconsidered Once Again." *Review of Educational Research* 71 (1): 1–27. https://doi.org/10.3102/00346543071001001.

Dobrow, Shoshana R., Wendy K. Smith, and Michael A. Posner. 2011. "Managing the Grading Paradox: Leveraging the Power of Choice in the Classroom." *Academy of Management Learning & Education* 10 (2): 261–76. https://doi.org/10.5465/amle.10.2.zqr261.

Dyer, Suzette L., and Fiona Hurd. 2016. ""What's Going On?" Developing Reflexivity in the Management Classroom: From Surface to Deep Learning and Everything in Between." *Academy of Management Learning & Education* 15 (2): 287–303. https://doi.org/10.5465/amle.2014.0104.

Eskildsen, Anita, Vita Ligaya Dalgaard, Kent Jacob Nielsen, Johan Hvid Andersen, Robert Zachariae, Lis Raabæk Olsen, Anders Jørgensen, and David Høyrup Christiansen. 2015. "Cross-cultural Adaptation and Validation of the Danish Consensus Version of the 10-Item PerceivedStress Scale." *Scandinavian Journal of Work, Environment & Health* 41 (5): 486–90. https://doi.org/10.5271/sjweh.3510.

Golding, Clinton. 2019. "Discerning Student Thinking: A Practical Theoretical Framework for Recognising or Informally Assessing Different Ways of Thinking." *Teaching in Higher Education* 24 (4): 478–92. https://doi.org/10.1080/13562517.2018.1491024.

Guberman, Daniel. 2021. "Student Perceptions of an Online Ungraded Course." *Teaching & Learning Inquiry* 9 (1): 86–98. https://doi.org/10.20343/teachlearninqu.9.1.8.

Hayek, Anne-Sophie, Claudia Toma, Dominique Oberlé, and Fabrizio Butera. 2015. "Grading Hampers Cooperative Information Sharing in Group Problem Solving." *Social Psychology* 46 (3): 121–31. https://doi.org/10.1027/1864-9335/a000232.

Hendry, John. 2006. "Educating Managers for Post-Bureaucracy: The Role of the Humanities." *Management Learning* 37 (3): 267–81. https://doi.org/10.1177/1350507606067160.

Hughes, Mary Elizabeth, Linda J. Waite, Louise C. Hawkley, and John T. Cacioppo. 2004. "A Short Scale for Measuring Loneliness in Large Surveys: Results From Two Population-Based Studies." *Research on Aging* 26 (6): 655–72. https://doi.org/10.1177/0164027504268574.

Jackson, Maria, and Leah Marks. 2016. "Improving the Effectiveness of Feedback by Use of Assessed Reflections and Withholding of Grades." *Assessment & Evaluation in Higher Education* 41 (4): 532–47. https://doi.org/10.1080/02602938.2015.1030588.

Khanna, Maya M. 2015. "Ungraded Pop Quizzes: Test-Enhanced Learning Without All the Anxiety." *Teaching of Psychology* 42 (2): 174–78. https://doi.org/10.1177/0098628315573144.

Kjærgaard, Annemette, Elisabeth Naima Mikkelsen, and Julie Buhl-Wiggers. 2022. ""The Gradeless Paradox: Emancipatory Promises but Ambivalent Effects of Gradeless Learning in Business and Management Education." *Management Learning* 135050762211011. https://doi.org/10.1177/13505076221101146.

Klapp, Alli. 2015. "Does Grading Affect Educational Attainment? A Longitudinal Study." *Assessment in Education: Principles, Policy & Practice* 22 (3): 302–23. https://doi.org/10.1080/0969594X.2014.988121.

Knowlton, Dave S. 2010. "Take Out the Tests, and Hide the Grades; Add the Spiritual with All Voices Raised! Professor Explications and Students' Opinions of an Unconventional Classroom Milieu." *Critical Questions in Education* 1 (2): 70–93.

Kohn, Alfie. 1993. *Punished by Rewards: The Trouble with Gold Stars, Incentive Plans, A'S, Praise, and Other Bribes*. New York, USA: Mariner Books.

Lassesen, Berit. 2011. "Student Approach to Learning: An Empirical Investigation of Factors Associated with Student Approach to Learning." PhD thesis, Department of Psychology and Behavioural Sciences, Aarhus University.

Lisnyj, Konrad, David L. Pearl, Jennifer E. McWhirter, and Andrew Papadopoulos. 2022. "Examining the Influence of Human and Psychological Capital Variables on Post-Secondary Students' Academic Stress." *Studies in Higher Education* 47 (12): 2508–22. https://doi.org/10.1080/03075079.2022.2083101.

Longmore, Anne-Liisa, Ginger Grant, and Golnaz Golnaraghi. 2018. "Closing the 21st-Century Knowledge Gap: Reconceptualizing Teaching and Learning to Transform Business Education." *Journal of Transformative Education* 16 (3): 197–219. https://doi.org/10.1177/1541344617738514.

Lynch, Raymond, and Jennifer Hennessy. 2017. "Learning to Earn? The Role of Performance Grades in Higher Education." *Studies in Higher Education* 42 (9): 1750–63. https://doi.org/10.1080/03075079.2015.1124850.

Matthews, Richard, and Andrew Noyes. 2016. "To Grade or Not to Grade: Balancing Formative and Summative Assessment in Post-16 Teacher Trainee Observations." *Journal of Further and Higher Education* 40 (2): 247–61. https://doi.org/10.1080/0309877X.2014.953456.

McMorran, Chris, and Kiruthika Ragupathi. 2020. "The Promise and Pitfalls of Gradeless Learning: Responses to an Alternative Approach to Grading." *Journal of Further and Higher Education* 44 (7): 925–38. https://doi.org/10.1080/0309877X.2019.1619073.

McMorran, Chris, Kiruthika Ragupathi, and Simei Luo. 2017. "Assessment and Learning Without Grades? Motivations and Concerns with Implementing Gradeless Learning in Higher Education." *Assessment & Evaluation in Higher Education* 42 (3): 361–77. https://doi.org/10.1080/02602938.2015.1114584.

Niederle, Muriel, and Lise Vesterlund. 2010. "Explaining the Gender Gap in Math Test Scores: The Role of Competition." *Journal of Economic Perspectives* 24 (2): 129–44. https://doi.org/10.1257/jep.24.2.129.

Nielsen, Tine. 2018. "The Intrinsic and Extrinsic Motivation Subscales of the Motivated Strategies for Learning Questionnaire: A Rasch-Based Construct Validity Study." Edited by Sammy King Fai Hui. *Cogent Education* 5 (1): 1504485. https://doi.org/10.1080/2331186X.2018.1504485.

Normann, Dan-Anders, Lise Sandvik, and Henning Fjørtoft. 2022. "A Scoping Review of Research on Reduced Grading." In *EARLI SIG 1 and 4*. Cadiz, Spain.

Nyström, Kristina. 2018. "When Students Are Allowed to Choose: Grading Scale Choices for Degree Projects." *Studies in Higher Education* 43 (11): 1993–2002. https://doi.org/10.1080/03075079.2017.1290062.

Oliver, Beverley, and Trina Jorre de St Jorre. 2018. "Graduate Attributes for 2020 and Beyond: Recommendations for Australian Higher Education Providers." *Higher Education Research & Development* 37 (4): 821–36. https://doi.org/10.1080/07294360.2018.1446415.

Parks-Leduc, Laura, Leigh Mulligan, and Matthew A. Rutherford. 2020. "Can Ethics Be Taught? Examining the Impact of Distributed Ethical Training and Individual Characteristics on Ethical Decision-Making." *Academy of Management Learning & Education* 20 (1): 30–49. https://doi.org/10.5465/amle.2018.0157.

Pintrich, Paul R., and And Others. 1991. "A Manual for the Use of the Motivated Strategies for Learning Questionnaire (MSLQ)." https://eric.ed.gov/?id=ED338122.

Pulfrey, Caroline, Céline Buchs, and Fabrizio Butera. 2011. "Why Grades Engender Performance-Avoidance Goals: The Mediating Role of Autonomous Motivation." *Journal of Educational Psychology* 103 (3): 683–700. https://doi.org/10.1037/a0023911.

Pulfrey, Caroline, Céline Darnon, and Fabrizio Butera. 2013. "Autonomy and Task Performance: Explaining the Impact of Grades on Intrinsic Motivation." *Journal of Educational Psychology* 105 (1): 39–57. https://doi.org/10.1037/a0029376.

Ragupathi, Kiruthika. 2022. "Illuminating the Interactions between Ideologies, Academic Subjectivities, and Practices in a Hybrid Graded/Gradeless Learning Environment: An Ethnographic Study Deploying the Practice Lens." Application/pdf, 4522182 B, 221 pages. https://doi.org/10.17635/LANCASTER/THESIS/1889.

Roberts, Rachel M., and Diana S. Dorstyn. 2017. "Does Changing Grade-Based Marking to Pass-Fail Marking Change Student Achievement in a Postgraduate Psychology Course?" *Training and Education in Professional Psychology* 11 (1): 57–60. https://doi.org/10.1037/tep0000129.

Rohe, Daniel E., Patricia A. Barrier, Matthew M. Clark, David A. Cook, Kristin S. Vickers, and Paul A. Decker. 2006. "The Benefits of Pass-Fail Grading on Stress, Mood, and Group Cohesion in Medical Students." *Mayo Clinic Proceedings* 81 (11): 1443–48. https://doi.org/10.4065/81.11.1443.

Schinske, Jeffrey, and Kimberly Tanner. 2014. "Teaching More by Grading Less (or Differently)." *CBE—Life Sciences Education* 13 (2): 159–66. https://doi.org/10.1187/cbe.cbe-14-03-0054.

Schneider, Jack, and Ethan Hutt. 2014. "Making the Grade: A History of the A–F Marking Scheme." *Journal of Curriculum Studies* 46 (2): 201–24. https://doi.org/10.1080/00220272.2013.790480.

Smith, Emma, and Stephen Gorard. 2005. "'They Don't Give Us Our Marks': The Role of Formative Feedback in Student Progress." *Assessment in Education: Principles, Policy & Practice* 12 (1): 21–38. https://doi.org/10.1080/0969594042000333896.

Smith, Jeffrey K., and Lisa S. Smith. 2019. "Grading in Higher Education." In *What We Know about Grading: What Works, What Doesn't, and What's Next*, edited by Thomas R. Guskey, and Susan M. Brookhart, 195–213. Alexandria, VA: ASCD.

Spring, Laura, Diana Robillard, Lorrie Gehlbach, and Tiffany A. Moore Simas. 2011. "Impact of Pass/Fail Grading on Medical Students' Well-Being and Academic Outcomes." *Medical Education* 45 (9): 867–77. https://doi.org/10.1111/j.1365-2923.2011.03989.x.

Stommel, Jesse. 2020. "Ungrading: An FAQ." *Jesse Stommel*, February 6. https://www.jessestommel.com/ungrading-an-faq/.

Stommel, Jesse. 2022. "Compassionate Grading Policies." Www.jessestommel.com. *Jesse Stommel* (blog), January 3. https://www.jessestommel.com/compassionate-grading-policies/.

Sutherland, Dylan, Philip Warwick, John Anderson, and Mark Learmonth. 2018. "How Do Quality of Teaching, Assessment, and Feedback Drive Undergraduate Course Satisfaction in U.K. Business Schools? A Comparative Analysis with Nonbusiness School Courses Using the U.K. National Student Survey." *Journal of Management Education* 42 (5): 618–49. https://doi.org/10.1177/1052562918787849.

Tannock, Stuart. 2017. "No Grades in Higher Education Now! Revisiting the Place of Graded Assessment in the Reimagination of the Public University." *Studies in Higher Education* 42 (8): 1345–57. https://doi.org/10.1080/03075079.2015.1092131.

Tippin, Gregory K., Kathryn D. Lafreniere, and Stewart Page. 2012. "Student Perception of Academic Grading: Personality, Academic Orientation, and Effort." *Active Learning in Higher Education* 13 (1): 51–61. https://doi.org/10.1177/1469787411429187.

Walker, Kent, Bruno Dyck, Zhou Zhang, and Frederick Starke. 2019. "The Use of Praxis in the Classroom to Facilitate Student Transformation." *Journal of Business Ethics* 157 (1): 199–216. https://doi.org/10.1007/s10551-017-3630-3.

Walkington, Helen, and Belinda Ommering. 2022. "How Does Engaging in Authentic Research at Undergraduate Level Contribute to Student Well-Being?" *Studies in Higher Education* 47 (12): 2497–507. https://doi.org/10.1080/03075079.2022.2082400.

White, Casey B., and Joseph C. Fantone. 2010. "Pass–Fail Grading: Laying the Foundation for Self-Regulated Learning." *Advances in Health Sciences Education* 15 (4): 469–77. https://doi.org/10.1007/s10459-009-9211-1.