https://doi.org/10.31489/2025Ped2/170-177
UDC 378.4
Received: 03.04.2025| Accepted: 03.04.2025

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Inequity by Design: How Bell Curve Grading Undermines Student Success

The Bell Curve approach is a method of assessment that compares students to one another and grades them by following a normal distribution pattern. Such a model entails a small number of high achievers, a large group clustered around the average, and a minority with low scores or failing. Despite widespread criticisms, the Bell Curve approach is still used nowadays in higher education worldwide due to its expected capacity to prevent grade inflation, differentiate student abilities, and foster a competitive framework. Through a qualitative, argument-driven analysis, this study highlights the Bell Curve system's flaws by addressing its misalignment with principles of educational equity, negative impact on students' motivation, and unintended promotion of mediocrity. The analysis further reveals the system's limitations, particularly when applied to small cohorts or across varying academic levels, and debunks some of the myths related to the assumed values of the Bell Curve grading. In light of the main findings, alternative approaches — such as criterion-referenced grading, mastery-based learning, and formative assessment strategies — seem more effective in supporting fair, meaningful, and equitable assessments in today's educational landscape.

Keywords: Bell Curve, criterion-referenced grading, formative assessment, higher education, inequity, mastery-based learning, mediocrity, normal distribution.

Introduction

The Bell Curve, also known as Gaussian curve, was firstly conceived in the eighteenth century as a model to address mathematical issues. It is grounded in the assumption that most natural phenomenon and human traits, such as intelligence or height, follow a normal distribution when examined from a statistical perspective (Fendler and Muzaffar, 2008). Visually, this distribution resembles a bell-shaped curve, with values centered around the mean and frequencies decreasing symmetrically as values diverge from the center.

In the mid-20th century, this model gained traction in academia as a method to differentiate student performance by embracing the hypothesis that only a small fraction of students might attain high or low scores, while the others would naturally cluster around the average. (Cohen, 2018). This approach, therefore, enforces a normal distribution that ostensibly prevents cases of grade inflation or extended failures by limiting the number of students who can attain the highest or lowest marks (Curwin, 2014).

In the last decades, Bell Curve grading has faced increasing criticisms, mostly due to its arbitrary distributions of marks that neglects students' background and/or just ignore the above-average capacity of certain groups. And yet, this approach is still used and promoted in a number of higher education institutions globally. Indeed, addressing how such a model directly influences student learning, well-being, and the fairness of academic assessment keeps a central relevance in the academic world.

This article critically examines the Bell Curve approach and underlines its negative impact in the educational learning process. The key research questions are: what are the current benefits and limits of the Bell Curve approach in higher education? How other methods of assessment could compensate such weaknesses? The main goal is to demonstrate how this model of grading perpetuates inequity and promotes mediocrity by rewarding average performance over true academic achievement. Alternative methods of assessment seem, on the contrary, to offer better conditions for both the learning process and personal development.

Structurally, to begin with, this paper provides a theoretical framework of analysis by drawing from educational psychology, assessment theory, and critical pedagogy. Next, it explains the qualitative research methodology chosen by the author to identify and critically examine the underlying assumptions and effects of Bell Curve grading system in education. Then, it proceeds with the analysis and discussion of results. First, it examines key criticisms of Bell Curve grading, with a focus on its impact on equity, motivation, and academic outcomes, as well as issues arising from its misapplication in small groups and neglect of devel-

opmental progress. Second, it considers why some researchers continue to support the Bell Curve grading system in higher education and tries to rebut such arguments. Finally, this study proposes a shift toward alternative grading models — such as criterion-referenced grading (Popham, 2011), mastery-based learning models (Guskey and Link, 2019), and formative assessment practices (Black and Wiliam, 1998) — which seems to better align with the principles of educational equity, intrinsic motivation, and growth potential.

Methods and Materials

From a theoretical perspective, this study explores three fundamental principles that boost quality in higher education contexts: educational equity, intrinsic motivation, and growth potential. Arguably, these principles serve as cornerstones for fostering inclusive, engaging, and forward-thinking learning environments in higher education.

The concept of educational equity emphasizes fair and individualized access to academic opportunities and resources. Equity theorists argue that a "one-size-fits-all" approach fails to account for individual learning differences and social inequities among students. As a result, a standardized grading often disadvantages those who may already be marginalized within academic settings (Cohen, 2018). Differently, assessments that are adaptive and sensitive to individual progress and achievements, rather than comparative rankings, might promote a more inclusive learning environment.

According to Deci and Ryan's Self-Determination Theory (2000), learning environments that promote autonomy, competence, and relatedness enhance intrinsic motivation, which is essential for sustained academic engagement. In other terms, students best operate in an educational environment in which the feel themselves effective, autonomous and able to develop meaningful connections. Grading practices that prioritize competition and restrict high achievement to a small number of students can subvert these motivational factors by creating a competitive rather than cooperative framework. In due course, this restrictive system could discourage risk-taking, undermine motivation and lead students to focus solely on securing an average standing rather than striving for excellence.

In the view of Maslow (1968) and Bloom (1976), educational systems should prioritize helping students reach their full potential by fostering an environment that meets essential psychological needs, supports growth, and emphasizes mastery of skills. This requires adopting models that build on foundational knowledge and progress through increasingly complex cognitive skills, while also creating a collaborative culture where students support each other, thus enhancing both motivation and meaning in learning. Ultimately, the focus of education should be on fostering personal growth, fulfillment, and achievement instead of recreating a kind of state-of-nature scenario characterized by a "war" of all against all.

Methodologically, this article takes a qualitative, argument-driven approach to assess Bell Curve grading within the broader discussions of fair, effective, and equitable assessment practices. Following Creswell and Poth's (2018) framework for qualitative research and Snyder's (2019) guidelines for literature review methodology, this study utilizes a theoretical and literature-based analysis to critically examine existing perspectives. Sources were selected based on their relevance, credibility and currency by searching keywords like, for example, "Bell Curve grading," "alternative educational grading methods," and "limits of norm-referenced grading" in diverse academic databases such as Google Scholar, ResearchGate and SCOPUS. In addition, the author used two AI academic research platforms such as Elicit and Research Rabbit to ensure a comprehensive coverage of significant scientific literature.

The abstracts of the identified sources were checked by the author to assess their relevance considering the scope of this article. Selected sources were, then, analyzed through a qualitative coding approach. The identified key themes were organized into three categories: the limits of the Bell Curve grading, counterarguments supporting the model, and alternative assessment methods. This thematic organization allowed for a systematic synthesis of diverse perspectives, providing a thorough critique of Bell Curve grading and its alternatives.

On the whole, this methodological approach ensures a balanced and thorough exploration of Bell Curve grading, offering insights that contribute to ongoing debates about fairness and equity in educational assessment practices.

Results and Discussion

There are four primary arguments against the Bell Curve grading system: first, its inherent inequity; second, its detrimental effect on students' motivation; third, its promotion of mediocrity over excellence;

fourth, its flawed application. Each argument is critically examined here to show how Bell Curve grading fails to align with contemporary educational goals and standards of quality.

A central critique of Bell Curve grading is its failure to align with principles of educational equity. Bell Curve grading enforces a fixed distribution of grades, regardless of the actual understanding capacities within a group of students. Therefore, this approach requires that some students will inevitably be categorized as "below average" or "failing" even if their performance meets established learning standards. Additionally, Bell Curve grading's rigid distribution, which restricts the number of students who can receive high grades regardless of their actual achievements, could artificially position some students outside of the top mark group notwithstanding their complete accomplishment of the intended learning outcomes. This approach can, therefore, lead to unfair assessments, particularly for students from marginalized backgrounds who may face additional educational barriers (Cohen, 2018). As a result, Brookhart (2021) argues that a one-size-fits-all grading model such as the Bell Curve should be abandoned as it fails to accommodate different learning paces and does not adapt to individual student progress. Rowe and Stewart (2019) critique the Bell Curve for perpetuating a system that favors students with access to high-quality preparatory resources while disadvantaging those without such support. Likewise, Reeves (2020) suggests that Bell Curve grading can create an environment of distrust in the student-teacher relationships, as students may feel unfairly evaluated.

A second criticism is that Bell Curve grading creates a competitive atmosphere that undermines intrinsic motivation by artificially limiting the number of students that can earn high grades and pitting them against each other. It is commonly believed that this rivalry-driven system might foster anxiety, reduce students' engagement, and foster a "survival" mindset, thus undermining motivations and creating a barrier to effective learning (Roberts and Engelhard, 2021; Harackiewicz et al., 2002). A further drawback of Bell Curve grading is its detrimental effects on students' ability to develop teamwork skills. By creating a zero-sum environment that constrains the number of successful students, the Bell Curve system encourages students to focus on outperforming peers rather than engaging meaningfully with course content, ultimately detracting their attention from the learning experience (Schinske and Tanner, 2019). Hill and Kumar (2020) further extend this argument by suggesting that grading practices promoting excessive competition diminish collaborative learning and can even lead to an overemphasis on extrinsic goals, such as grades, rather than understanding, knowledge, and skills development.

A third limit of the Bell Curve grading is its promotion of mediocrity as a direct effect of its standard distribution of grades. This practice can discourage some students from striving for excellence, as only a limited number can achieve top grades, even in cases where more students have demonstrated outstanding knowledge and skills in the subject. Indeed, enforcing a Bell Curve distribution may unfairly penalize competent students in smaller or highly skilled groups. Paradoxically, in courses with struggling students, the same approach may artificially inflate the success of some of them. As a result, in the view of Krumboltz and Yeh (1996), the Bell Curve grading "sabotages" good teaching by creating a false dilemma for educators between fostering students' learning and evaluating them comparatively. A possible solution might be to foster the engagement of students in the assessment process. However, this would be only feasible once starting to "debunk the myth that normal-as-average is sacred" (Tan et al., 2020:8).

Finally, the Bell Curve grading is often applied wrongly in education. As a statistical model, Bell Curve approach is grounded on the assumption of large sample sizes where individual variations align with a normal distribution (Fendler and Muzaffar, 2008; Smyth and Bailey, 2022). However, this model is frequently applied to small groups where such distributions are less likely, thus creating artificial and unfair distinctions among students (Bailey and Smyth, 2022). For such a reason, Brookhart (2021) critiques the Bell Curve emphasizing that, without sufficient sample sizes, it produces arbitrary evaluations that do not accurately reflect effective learning. Furthermore, the Bell Curve grading ignores the fact that students' skills and knowledge typically develop from their first to final years of studying, particularly in undergraduate programs. Therefore, using the same distribution of marks across first-year and senior students disregards how academic and cognitive skills evolve, penalizing students who might have shown considerable improvements throughout their academic trajectory. (Shapiro and Blum, 2022) In this regard, Rowe and Stewart (2019) argue that criterion-based grading allows for a more accurate reflection of individual student progress and growth over time.

Table 1 sums up the main criticisms against the Bell Curve grading.

Table 1

Critisms against the bell curve grading system

ARGUMENT	EXPLANATION	SUPPORTING LITERATURE
Inequity in Assessment	Bell Curve grading enforces a fixed distribution regardless of actual performance and ignoring the diversity in students' background.	Brookhart (2021); Cohen (2018); Reeves (2020); Rowe & Stewart (2019).
Detrimental Impact on Motivation and Teambuilding	Competitive grading diminishes intrinsic motivation by prioritizing student ranking over individual mastery, increasing anxiety and decreasing collaborative efforts.	Harackiewicz et al. (2002); Hill & Kumar (2020); Roberts & Engelhard (2021); Schinske & Tanner (2019).
Promotion of Mediocrity	Bell Curve grading discourages excellence, as only a limited number of students can earn top grades, regardless of cohort quality.	Krumboltz & Yeh (1996); Tan et al. (2020).
Incorrect Application in Small Groups and Neglecting Developmental Progress	Bell Curve grading is less effective in small groups, where variations do not follow a normal distribution, leading to arbitrary grade distinctions. Bell Curve grading also overlooks student progress by applying the same criteria regardless of academic level or year.	Bailey & Smyth 2022; Brookhart (2021); Shapiro & Blum (2022); Rowe & Stewart (2019)

Notwithstanding the above-mentioned criticisms, there are still some authors advocating for the use of the Bell Curve grading in higher education. A first advantage of the Bell Curve grading is that it prevents the risk of grade inflation by standardizing the distribution of marks. (Bar and Essary, 2020; Ellis, 2018) Even though such claim seems logic and reasonable at first glance, a forced distribution of grades is only a possible option to ensure rigorous standards. For instance, Hill and Kumar (2020) argue that criterion-referenced assessments uphold rigor by aligning student evaluation with transparent performance criteria rather than arbitrary comparisons. Likewise, Guskey and Link (2019) sustain that clear and reasonable intended learning outcomes are enough to prevent inflation by tying grades to mastery. Also, Roberts and Engelhard (2021) emphasize that competency-based standards ensure grades reflect effective achievement without arbitrary limits. Therefore, there are alternative methods that can deal with the potential problem of grade inflation without following a normative-grading system.

Second, Mansfield (2019) claims that Bell Curve grading clearly differentiates student abilities, providing meaningful distinctions that benefit competitive programs. Nevertheless, differentiation seems even more achievable through a method of assessment that specifically addresses knowledge and competencies rather than enforcing a fixed distribution. In this regard, Tormey and Henrichsen (2021), for example, recommend mastery-based assessments to allow students to demonstrate proficiency across dimensions, offering a fuller view of their strengths and weaknesses.

As final note, Kramer (2021) argues that Bell Curve grading fosters a competitive atmosphere that prepares students for real-world challenges. In his view, competition reflects the requirements of contemporary professional careers where performance is often compared to that of others. Introducing such an element within the educational framework might, therefore, endorse students to do their best in class. Moreover, diverse studies (Martin and Marsh, 2020; Yang and Shi, 2021) seem to support the idea that competitive environments may stimulate leadership skills by fostering qualities like resilience, strategic thinking, and adaptability. Therefore, by pushing students to compete for the top marks, the Bell Curve approach might foster students' capacity to succeed later on in a business environment.

This viewpoint offers a compelling and reasonable foundation. However, many professional environments prioritize collaborative problem-solving, emotional intelligence, and cooperative learning over direct competition. Indeed, a collaborative environment aligned with mastery-based assessments would better prepare students for the demands of a team-oriented workplace. (Shapiro and Blum, 2022) Moreover, competi-

tive dynamics can also be introduced in grading systems that do not strictly follow a norm-referenced assessment (Black and Wiliam, 2018). Various mechanisms could be used to achieve that, such as reward structures, elements of gamification, or project-based competitions. Therefore, educational environments that foster collaboration, resilience, and proficiency over isolated performance metrics may better prepare students for their future professional life by boosting both technical and interpersonal skills.

Considering its overall limitations and constrained benefits, the Bell Curve is not viewed anymore as the best option in the academic grading process. As a result, educators and researchers have proposed alternative models of assessment that prioritize individual growth and proficiency. Criterion-referenced grading, for instance, evaluates students based on their achievement of defined learning outcomes rather than relative performance (Popham, 2011). This approach is particularly suitable for small groups and ensures that grades reflect students' actual accomplishments (Smith and Harris, 2023). Diverse studies (Brookhart, 2021; Rowe and Stewart, 2019; Tormey and Henrichsen, 2021) noted how the criterion-referenced grading fosters inclusivity by focusing on individual progress and provides a fairer assessment regardless of class size.

Alternatively, mastery-based grading emphasizes individual progress, allowing students to demonstrate learning over time. In other term, the mechanism of assessment is focused on the specific improvements of the addressed individual. This model is particularly beneficial in settings with varying stages of learning, as it accommodates the unique trajectories of first-year and senior students alike. Guskey and Link (2019) advocate for mastery-based grading as it supports deeper learning and is adaptable to the developmental stages of students. Similarly, Schinske and Tanner (2019) argue that mastery-based models promote a growth mindset, where students see progress as an ongoing process.

A further option is formative assessment, which offers ongoing feedback to students so that they might suddenly intervene on their weaknesses and improve them. This method supports the learning process without the stress of high-stakes competition as the assessments are not typically graded. Black and Wiliam (1998) argue that formative assessments foster a growth-oriented mindset by enabling students to recognize areas for improvement. Shapiro and Blum (2022) further suggest that formative assessments promote resilience and inclusion, helping all students pursue high achievement without the constraints of forced competition. As cons, this model can be hardly integrated in a system aimed to produce a final evaluation of the students.

Table 2 compares the diverse methods of rating examined in this article.

Table 2

Comparative analysis of diverse grading approaches

GRADING APPROACH	CORE FEATURES	PRIMARY GOAL	ADVANTAGES	DISADVANTAGES
Bell Curve Grading	Grades are distributed along a normal curve, assigning fixed percentages for high, average, and low scores.	Differentiate students by performance relative to peers.	Maintains a clear ranking of students; may prevent grade inflation; fosters a competitive atmosphere.	Can demotivate students; promotes competition over mastery and/or collaboration; may unfairly label capable students as "average"; can be applied incorrectly.
Criterion-Referenced Grading	Students are graded based on whether they meet specific criteria or learning outcomes.	Assess each student against an absolute standard.	Encourages mastery of content; provides clarity in expectations and feedback.	Requires well-defined criteria; may be challenging to implement consistently across diverse topics.
Mastery-Based Grading	Students must demonstrate mastery of specific competencies or skills.	Ensure all students reach a standard level of competency.	Fosters deep understanding; reduces competition; allows for individualized pacing and feedback.	Can be time-consuming for instructors; requires significant adjustments to traditional grading systems.

Continuation of Table 2

GRADING APPROACH	CORE FEATURES	PRIMARY GOAL	ADVANTAGES	DISADVANTAGES
Formative Assessment	Students get ongoing feedback throughout the learning process.	Support and enhance a pressure-free learning process through feedback.	Encourages reflection, self-assessment, and improvement; reduces grade anxiety.	Can be challenging to track progresses; can result unclear for students used to typical grades.

Conclusion

The implementation of Bell Curve grading demonstrates many limitations. The fundamental problem resides in its design, which intrinsically restricts student performance and cultivates an environment where mediocrity, rather than success, prevails. As a result, the Bell Curve may unintentionally undermine students' motivations and hinder collaborative learning results. Moreover, the use of Bell Curve grading frequently overlooks essential contextual elements, such class size, students' academic proficiency, and the diversity of educational backgrounds. These variables can substantially distort the mark distribution, rendering Bell Curve grading both ineffective and ethically dubious.

In light of these findings, educational institutions should move beyond norm-referenced grading practices and consider the Bell Curve solely as a general reference model for understanding mark distribution trends in large datasets. Differently, alternative assessment approaches, including criterion-referenced and mastery-based grading as well as formative assessment, can yield more precise representations of student comprehension and development, thus aligning better with the diverse needs of modern education while maintaining high academic standards.

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А. Фриджерио

Теңсіздік тұжырымдамасы: қоңырау тәрізді қисыққа сәйкес бағалау студенттердің үлгерімін қалай әлсіретеді

Қоңырау тәрізді қисық — бұл студенттерді бір-бірімен салыстырып, олардың бағаларын қалыпты таралу үлгісіне сәйкес анықтайтын бағалау әдісі. Мұндай үлгі аздаған үздіктерді, орташа бағаларға шоғырланған негізгі топты және төмен бағаларға немесе қанағаттанарлықсыз нәтижелерге ие шағын топты болжайды. Кең таралған сынға қарамастан, қоңырау тәрізді қисық жоғары білім беру саласында әлі де жиі қолданылады. Бұл әдіс бағалардың инфляциясын болдырмау, студенттердің қабілеттерін саралау және бәсекелестік орта қалыптастыру қабілетімен негізделеді. Сапалы әрі дәлелді талдау арқылы бұл зерттеу қоңырау тәрізді қисық жүйесінің білім берудегі теңдік принциптеріне сәйкес келмейтінін, яғни студенттердің ішкі мотивациясына теріс әсерін және бағаларды тұрақты үлестіру арқылы орташа мәнді енгізуін көрсетеді. Талдау жүйенің шектеулерін одан әрі ашады, әсіресе шағын топтарға немесе әртүрлі академиялық деңгейлерге қолданылғанда және қоңырау қисығы бойынша бағалаудың болжамды артықшылығына байланысты кейбір мифтерді жоққа шығарады. Негізгі нәтижелерге сүйене отырып, критерийге негізделген бағалау, шеберлікке негізделген оқыту және қалыптастырушы бағалау сияқты баламалы тәсілдер бүгінгі білім беру жүйесінде әділ, дәйекті және бейтарап бағалауды қолдауға әлдеқайда тиімді екені анық.

Кілт сөздер: қоңырау тәрізді қисық, критерийге негізделген бағалау, қалыптастырушы бағалау, жоғары білім, теңсіздік, шеберлікке негізделген оқыту, орташа мән, қалыпты таралу.

А. Фриджерио

Неравенство по замыслу: как оценка по колоколообразной кривой подрывает успеваемость студентов

Колоколообразная кривая — это метод оценки, который сравнивает студентов друг с другом и оценивает их, следуя модели нормального распределения. Такая модель подразумевает небольшое число отличников, большую группу, сгруппированную вокруг средних оценок, и меньшинство с низкими оценками или неудовлетворительными результатами. Несмотря на широко распространенную критику, колоколообразная кривая до сих пор используется в высшем образовании по всему миру из-за ее ожидаемой способности предотвращать инфляцию оценок, дифференцировать способности студентов и способствовать развитию конкурентной среды. С помощью качественного, аргументированного анализа настоящее исследование подчеркивает несоответствие системы колоколообразной кривой принципам образовательного равенства, ее негативное влияние на внутреннюю мотивацию студентов и ее непреднамеренное поощрение посредственности путем навязывания фиксированного распределения оценок. Анализ далее раскрывает ограничения системы, особенно при применении к небольшим когортам или на разных академических уровнях, и развенчивает некоторые мифы, связанные с предполагаемым преимуществом оценивания по колоколообразной кривой. В свете основных результатов альтернативные подходы, такие как оценка на основе критериев, обучение, основанное на мастерстве и стратегии формирующего оценивания, кажутся более эффективными для поддержки справедливой, обоснованной и беспристрастной оценки в сегодняшнем образовательном ландшафте.

Ключевые слова: колоколообразная кривая, оценка на основе критериев, формирующая оценивание, высшее образование, неравенство, обучение, основанное на мастерстве, посредственность; нормальное распределение.

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