

Alternatives to Conventional Grading: How Professors are Changing the Paradigm

A Sociotechnical Research Paper
presented to the faculty of the
School of Engineering and Applied Science
University of Virginia

by

Daniel Prohaska

April 9, 2021

On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

Daniel Prohaska

Sociotechnical advisor: Peter Norton, Department of Engineering and Society

Alternatives to conventional grading: How professors are changing the paradigm

Educators disagree about what good education is. Most educators would agree, however, that teaching serves students; teachers are merely the means to this end (Ackoff & Greenberg, 2008). Students have personalized learning styles that correspond with educators' teaching styles. Chetty et al. (2019) contend that student performance depends on matching these styles. Since 2010, how have professors advanced alternatives to the conventional grading model? Assessment methods influence the time and effort that students commit to study (Pacharn, Bay, & Felton, 2012). Some students conserve effort, seeking to do no more than necessary to graduate (Peschl, 2020). Others are ambitious, seeking high grades and the opportunities they promote. To such students, the grade may be more important than learning. They may seek a strategic path toward a high grade (Pacharn, 2012). Professors' views also vary. To some, active participation is essential to education (Ferber, 2020); others equate education with skill development (Tychonievich, 2012). Educators have developed alternatives to conventional grading by assessing knowledge in other ways, by increasing student participation, and by making grades more meaningful.

Review of Research

The usefulness of learning styles is inconclusive. Berková et al. (2020) found that learning styles are important in determining student performance, while other research does not show conclusive evidence (Pashler et al., 2008). Moallem (2007) found that student learning was enhanced by changing student interactions with online course material, independent of learning style. Kirschner and van Merrinēboer (2013) believe learning style research is unreliable due to self-reporting methodologies, and has limited definitions. Instead Cognitive Load Theory (CLT) research uses information processing as its basis. CLT suggests that learning is enhanced by

reducing a student's cognitive load. Using CLT, Moussa-Inaty, Atallah, and Causapin (2019) found that cognitive constraints predicted success better than learning styles. Pashler et al. (2008) suggest that pursuing other methodologies might be useful when researching learning styles.

Class participation research is more conclusive (Bekkering & Ward, 2020) suggesting that higher participation increases student performance (Coldwell et al., 2008). Teixeira (2016) found that absenteeism decreased student performance in both US and international data. Participation is not limited to attendance. Credé, Roch, and Kieszczynka (2010) concluded that attending and being active in class predicts performance better than a student's SAT scores, high school GPA, or study habits. Cell phone usage during class and multitasking with social media also decreased student performance (Felisoni & Godoi, 2018; Bekkering & Ward, 2020).

Game-based learning (GBL) teaches students through playing digital games. Players learn how to interact with a game while playing (Green and Bavelier, 2006). Games can teach critical thinking and classroom topics (Coleman & Money, 2020). GBL is difficult to facilitate because game developers don't emphasize learning while instructors don't make exciting games (Tahir & Wang 2020). Direct connections between learning and game playing are unclear, but games could make learning less stressful and more enjoyable (Coleman & Money, 2020). Jane McGonigal (2011) believes game developers can inspire players to achieve increasingly difficult tasks and facilitate cooperation among large groups. She contends this skill is vital for the 21st century.

Stealth learning is an advanced form of GBL that blurs the distinction between learning and assessment (Shute et al. 2021). Stealth learning collects data about students and makes predictions about their competency of a topic. It assesses students unobtrusively and over time. Min et al. (2020) use artificial intelligence in stealth learning. Previous works use probabilistic

approaches to assess knowledge. Min et al. (2020) use an evidence-based approach which is less intensive for educators to create. They found their system accurately predicts students' competencies and can expand to other topics. Most stealth learning research involves primary school students and needs testing in the collegiate setting (Shute et al. 2021).

Batts & Barksdale (2019) contend that cheating has not increased significantly, despite an increase in available technology. However, new technology has changed how students act dishonestly. Chegg is a popular website used for cheating (Adams & Kreznar, 2021) where students look up or request answers for exams and assignments (Lancaster & Cotarlan, 2021). Adams and Kreznar found that Chegg disrupts traditional assessments because students can get answers within exam timeframes. Since the pandemic Chegg's stock has grown 54% (Adams & Kreznar, 2021).

Different Ways to Assess Knowledge

In standards-based grading (SBG), grades measure degree of mastery. SBG has grown in popularity for K-12 education, but lags in higher education. Professor Jerrid Kruse applies SBG in an education technology course where students' grades measure attained proficiency in course subjects. Students may resubmit assignments and must demonstrate proficiency with Kruse. Though students reported anxiety about Kruse's unusual policies, they indicated the policies induced persistence. At the end of the term, 20 of the 21 students agreed that SBG promoted responsibility; the lone dissenter found the experiment useful. Among the students, 17 agreed that SBG improved learning. According to one: "SBG is a medium for assessment that aligns clearly to learning theory and our goals for students. ... I like using standards rather than points so the focus becomes concepts and ideas" (Buckmiller, Peters, & Kruse, 2017).

Stachel et al. (2013) investigated reducing cognitive loads for students. The researchers claim that introductory computer science students learn a multitude of different components at one time. Kelleher and Pausch (2005) contend that overburdening students increases stress and frustration. Stachel et al. (2013) observed modest improvements in lab grades where students reported less cognitive load. Caskurlu et al. (2021) found that many instructors intuitively incorporate strategies that align with Cognitive Load Theory (CLT), but training in CLT could improve course quality.

Pamungkas, Widiastuti, and Suharno (2019) tested learning styles with experiential learning. They contend that experience is the best way to learn in engineering. In experiential learning, students go beyond listening to lectures. Instead, students solve hands-on activities, interact with software, and collaborate with others (Brown et al., 2012). Students can master 75% of knowledge gained through experiential learning as compared to only 5% in conventional learning (Fulford, 2013). Brown et al. (2012) implemented experiential learning and found that engineers were more involved in the learning process and performed 30% better. Pamungkas, Widiastuti, and Suharno (2019) found that some learning styles are not aligned with experiential learning and that a multi-faceted approach is needed to effectively teach students.

Daphne Martinez (2020) uses portfolios as a creative way for students and teachers to assess progress. A portfolio is a collection of a student's work over time. Martinez (2020) contends that traditional assessment is not effective for students taking English as a second language because students of varying levels participate in the same course. Portfolios are tools for students to set personal goals and take responsibility for their learning (Hebert, 2001). Student portfolios show instructors and employers what they know (Rowan, 2014). Martinez

(2020) found that most students felt portfolios required more work than standard assessment, but thought it was worth the effort.

Keeton (2016) advocates for the use of contract grading. In contract grading instructors and students set personalized goals at the beginning of a semester. Grades are assigned based on how students meet their goals. In contract grading students play a larger role in their education and perceive workloads as less stressful (Ward, 2021). Keeton (2016) contends that contract grading is important for fields that have difficulty standardizing assignments. Keeton teaches voice lessons and values individual progress over current ability. Litterio (2018) found that students enjoyed creating criteria for assignments and self-assessing their progress.

The COVID-19 pandemic of 2020 reduced resources available to professors (Vander & Birrittella, 2021). This led professors to seek more efficient ways of grading. In peer grading students grade each other. Vander and Birrittella (2021) tested peer group grading where groups of students grade other groups of students. Students find it difficult to grade effectively and impartially (Strijbos, Narciss, & Dünnebier, 2010). Rigorous rubrics mitigate this concern (Kulkarni et al., 2013). Students were also allowed to contest a peer assigned grade. Vander and Birrittella (2021) found that anonymous peer group grading produced grades similar to instructor grading. Students perceived peer group grading as fair.

Student Driven Learning

In a flexible variant of conventional grading, students may influence the weighting of each assessment. At a Canadian university, Pacharn, Bay and Felton (2012) tested a system in which students determined assignment values (including class participation) within limited ranges. Students could adjust the values until the final exam. The researchers found that students who chose well early in the term had an advantage. High-risk strategies generally did not pay off,

and the experiment offered no evidence that the system is advantageous to students. In a specifications grading system, all assignments are pass/fail. Barbara Blodgett (2017) tested a specifications system where completing different combinations of assignments corresponds to letter grades. In some cases, students took more ownership of the course; all students were satisfied with their grades.

Class participation is low in college classrooms (Ahlfeldt et al. 2005). Attendance and participation in lectures increase student performance (Duncan, Kenworthy, & McNamara, 2012). At Northeastern State University, Bekkering and Ward (2020) tested Zoom's automated participation system in which attendance and attention were monitored. The system recorded student arrival and departure and how long they were clicked on the lecture. They tested two computer science courses: a theory-based course and a skills-based course with a lab. High participating students scored higher on exams in the theory course, but no correlation was found in the skills course. Bekkering and Ward (2020) found that tracking participation helped identify underperforming students. Automated participation monitoring reduced teachers' management responsibilities. No students voiced issues with the tracking software. Despite showing positive results, this system could not determine if a student was actively watching the lecture. Students in a different room or on another device would still be recorded as actively participating.

Bekkering and Ward use negative reinforcement to encourage participation. Using a different approach, Cheatham et al. (2017) evaluated positive reinforcement in three psychology courses. They adapted the Good Behavior Game (GBG) which is often used on younger students to encourage specific behaviors. In the GBG students are split into teams and score points by answering questions. The game can be played for competition or reward (Kleinman and Saigh 2011). Providing a reward may not be necessary (Dion et al., 2011). Cheatham et al. (2017)

found that students were more likely to answer questions when playing the GBG regardless of reward. Higher participation increases student performance (Coldwell et al., 2008). GBG is easy to implement because it does not require additional technologies or significant time to prepare (Cheatham et al., 2017; Walklet et al., 2016).

GBG provides gratification to students to incentivize participation. Gamification introduces game factors, like instant gratification, into non-game situations. Gamers maintain focus on difficult tasks for many hours (Green and Bavelier, 2006) while students often feel overwhelmed by difficult class assignments (Fotaris et al. 2016). Jane McGonigal (2011) asserts gamers stay focused because games have four elements: goals for a sense of purpose, rules to encourage creativity, feedback systems to motivate players, and voluntary participation to create a positive experience. In contrast, opponents of gamification dispute its effectiveness based on a lack of concrete evidence (Barata et al., 2013). O'Connor and Cardona (2019) implemented a system where psychology students choose their own path through a course. Each completed assignment gives experience points that count towards an overall grade. Results showed that few students completed the same set of assignments. Grades were not significantly different from the standard course. A majority of students enjoyed the gamified course more.

Fotaris et al. (2016) introduced trivia games like Who Wants To Be A Millionaire and Kahoot, and a leaderboard into computer science courses. The trivia games provided instant feedback to reinforce student learning. The leaderboard served as a goal. Leaderboards are only effective if participants think the effort is worthwhile (Landers, Bauer, & Callan, 2017). Goal setting is a powerful motivator across fields and tasks (Locke & Latham, 2002). Fotaris et al. (2016) credited the gamified elements for improvements in attendance, participation, and final

student grades. Students expressed increased enjoyment and confidence in material, while instructors were better prepared to answer questions (Fotaris et al., 2016).

Putting Grades to Work

Students rely on grades for a variety of reasons, including to qualify for scholarships, to fulfill course prerequisites, and for opportunities in graduate school and in career employment (Tychonievich, 2017). In conventional teaching methods, teachers assign values to assignments and calculate a weighted average for a final grade. Averaging performance produces an amalgamation that can be hard to understand and unbeneficial (Muñoz & Gurskey, 2015). Teachers must make grades more meaningful or find other forms of feedback.

Students may respond inappropriately to grades because traditional grading is assignment based and tells us little about knowledge of topics (Tychonievich, 2017). Traditional testing rarely measures a single topic or skill. A student earning 75 percent on four equally weighted assignments receives the same final grade as a student who earned three 100 percent grades and one zero percent. Though their understanding of the material varies markedly, their average is the same. Averaging misleads students if the zero was in important material (3x100 and a 0). If a professor believes students require a basic understanding of four equally important assignments, weighting assignments cannot resolve this issue. Definitional grading addresses this dilemma by specifying goals and corresponding grades (Walvoord & Anderson, 1998). One goal to solve this is to require passing all assignments to pass the course. This creates a multidimensional approach to grading. Averaging misleads students that miss the same topic across multiple assignments (4x75). For example since assignments tell little about topics (Tychonievich, 2017), students could miss every question concerning addition, but get all others correct. Without drastic changes to current assignments, traditional grading does not adequately reflect student learning. In both

cases of averaging, the traditional grading scale can be grossly distorted to mitigate these issues, but other students' grades would be adversely affected. In standards-based grading (SBG), curricula are reduced to individual learning goals by topic. This avoids grade distortion. In SBG, progress through learning goals governs assignments (TeacherEase, 2020). However, SBG complicates teachers' management responsibilities because students work on different material.

Professor Michael Schultz-Bergin (2019) allows students to assign themselves grades because he contends that standard grading “takes away from learning by discouraging a focus on what you are doing and discouraging taking risks that may lead to failure.” Professor Jason Mittell (2016) uses pass/fail grading because “grades often work as an obstruction to learning, rather than a motivation, reward, or neutral assessment.” To him, changing the grading culture would “be the most effective and impactful reform” at his institution. Professor Joanna Morris uses written narrative evaluations rather than grades because “with narrative evaluations, students don't compare themselves to each other; they compare themselves to the best that they can be” (Hampshire College, n.d.).

Education relies on academic integrity and yet dishonesty is widespread (Albluwi, 2020). A student found cheating reflects, “success without ethics is not true success ... my stress got the better of me during that exam. ... Stress is a part of life and will continue to occur both in my career and personal life” (Georgetown University, n.d.). Professor Ajay Shenoy believes cheating creates the “prisoner's dilemma” where students not cheating know they are at a disadvantage (Supiano, 2020). Grades must be accurate and equitable to be valuable. Tools have been developed to detect cheating. Using such a tool, a professor at the University of Virginia detected and reported 158 cases of potential plagiarism which led to 59 students formally accused of an honor offence (Batts & Barksdale, 2019). Joseph Brown (2020) believes students cheat due to

“time management, a poor grasp of the course content, feeling the class is irrelevant, and significant stress in or outside of the course can all unhone a student’s normal decision-making process.” More formally, Albluwi (2020) describes a Fraud Triangle where the three components are pressure, opportunity, and rationalization to commit fraudulent behavior. The majority of literature addresses opportunity, with pressure being the least prevalent (Albluwi, 2020). Traditional in-person examinations reduce plagiarism, but Bradley (2016) contends that time constraints of exams are not reflective of real-world situations. Instead Bradley (2016) introduces randomized elements to reduce plagiarism opportunity. He found that assignments with multiple solutions were better suited for randomisation. Using this system, providing useful feedback was difficult.

Stress and anxiety increase pressure to commit fraudulent behavior. Stress also reduces cognitive performance by decreasing focus and inhibiting retention (Moran, 2016). Stocker & Gallagher (2019) developed a system to reduce student stress. The system included weekly activities focused on social-emotional learning. Stocker & Gallagher (2019) found students had significantly higher confidence levels in difficult situations. During the COVID-19 pandemic of 2020, many classes have gone digital. Professors fear online classes and increased stress will lead to more cheating. Professor Douglas Mulford at Emory University found that using the traditional model of testing in the new environment did not work because the "the temptation became so high; the barrier to cheating became so low" (Supiano, 2020). Mulford used “Zoom proctoring” where teaching assistants watch students during an exam but found that at least 20% of students still cheated (Supiano, 2020). Professor Ajay Shenoy of the University of California at Santa Cruz decided to make his final exam open notes and increase time allowed, yet still received many reports of cheating (Supiano, 2020).

Conclusion

This study provides a unique contribution of how professors are changing the paradigm of traditional assessment. Much research on assessment and grading focuses on primary schools. Although some research involves universities, it is often inconclusive or tested with small samples sizes. Research seems promising for technical fields such as engineering but lacks positive results in social sciences. More research is needed in online learning as digital education increases due to technological advances and the COVID-19 pandemic. Many proposed advancements to assessment require increased management from instructors and are complicated by online education. Future research should explore assessment options that reduce instructor and student stress, and are versatile in online vs. in person requirements. Gamification could bridge the gap between in-person feedback and online distance learning.

References

- Ackoff, R., & Greenberg, D. (2008). 'The Objective of Education Is Learning, Not Teaching'. <https://knowledge.wharton.upenn.edu/article/the-objective-of-education-is-learning-not-teaching/>
- Adams, S., & Kreznar, C. (2021, February 1). Cheat For Profit. *Forbes*, 204(1), 72 - 77.
- Ahlfeldt, S., Mehta, S., & Sellnow, T. (2005). Measurement and analysis of student engagement in university classes where varying levels of PBL methods of instruction are in use. *Higher Education Research and Development*, 24, 5–20.
- Albluwi, I. (2020, February 1). Plagiarism in Programming Assessments: A Systematic Review. *ACM Transactions On Computing Education*, 20(1), 27.
- Barata, G., Gama, S., Jorge, J., & Goncalves, D. (2013). Engaging Engineering Students with Gamification. *International Conference on Games and Virtual Worlds for Serious Applications (VS-GAMES)*, 5, 1-8.
- Batts, J., & Barksdale, M. B. (2019). The Bloomfield Cases: Plagiarism and Technology Challenge the Honor Committee <https://report.honor.virginia.edu/bloomfield-cases>
- Bekkering, E., & Ward, T. (2020, December 1). Class Participation and Student Performance: A Tale of Two Courses. *Information Systems Education Journal*, 18(6), 86 - 98.
- Berková, K., Boruvková, J., Frencllovská, D., Krpálek, P., & Melas, D. (2020, January 1). Learning Style Preferences of University and College Students. *Problems of Education In the 21st Century*, 78(4), 486 - 499.
- Blodgett, B. J. (2017, October 1). Grading matters in theological education. *Teaching Theology & Religion*, 20(4), 314 - 326.
- Bradley, S. (2016). Managing plagiarism in programming assignments with blended assessment and randomisation. *ACM Proceedings of the 16th Koli Calling International Conference on Computing Education Research (Koli Calling '16)*, 21–30.
- Brown, A., Jensen, D., Rencis, J., Wood, K., Wood, J., White, C., ... Coffman, J. (2012, February 1). Finite Element Learning Modules as Active Learning Tools. *Advances In Engineering Education*, 3(1), 1 - 29.
- Brown, J. (2020). Talk to your student about academic integrity. <https://www.coloradoan.com/story/opinion/2020/09/05/opinion-talk-your-student-academic-integrity/5721072002/>

- Buckmiller, T., Peters, R., & Kruse, J. (2017). Questioning Points and Percentages: Standards-Based Grading (SBG) in Higher Education. *College Teaching*, 65(4), 151–157. Directory of Open Access Journals
- Caskurlu, S., Richardson, J. C., Alamri, H. A., Chartier, K., Farmer, T., Janakiraman, S., ... Yang, M. (2021, March 1). Cognitive load and online course quality: Insights from instructional designers in a higher education context. *British Journal of Educational Technology*, 52(2), 584 - 605.
- Cheatham, J. M., Ozga, J. E., St. Peter, C. C., Mesches, G. A., & Owsiany, J. M. (2017, September 1). Increasing Class Participation in College Classrooms with the Good Behavior Game. *Journal of Behavioral Education*, 26(3), 277 - 276.
- Chetty, N. D. S., Handayani, L., Sahabudin, N. A., Ali, Z., Hamzah, N., Rahman, N. S. A., & Kasim, S. (2019, December 1). Learning Styles and Teaching Styles Determine Students' Academic Performances. *International Journal of Evaluation and Research In Education*, 8(4), 610 - 615.
- Coldwell, J., Craig, A., Paterson, T., & Mustard, J. (2008, January 1). Online Students: Relationships between Participation, Demographics and Academic Performance. *Electronic Journal of e-Learning*, 6(1), 19 - 28.
- Coleman, T. E., & Money, A. G. (2020, March 1). Student-centred digital game-based learning: a conceptual framework and survey of the state of the art. *Higher Education*, 79(3), 415 - 457.
- Credé, M., Roch, S. G., & Kieszczynka, U. M. (2010). Class Attendance in College: A Meta-Analytic Review of the Relationship of Class Attendance With Grades and Student Characteristics. *Review of Educational Research*, 80(2), 272–295.
- Dion, E., Roux, C., Landry, D., Fuchs, D., Wehby, J., & Dupere, V. (2011). Improving attention and preventing reading difficulties among low-income first-graders: A randomized study. *Prevention Science*, 12, 70–79.
- Duncan, K., Kenworthy, A., & McNamara, R. (2012, August 1). The Effect of Synchronous and Asynchronous Participation on Students' Performance in Online Accounting Courses. *Accounting Education*, 21(4), 431 - 449.
- Felisoni, D. D., & Godoi, A. S. (2018, February 1). Cell phone usage and academic performance: An experiment. *Computers & Education*, 117, 175 - 187.
- Ferber, R. (2020). Teaching Dossier.
<https://taylorinstitute.ucalgary.ca/resources/sample-teaching-philosophy-statements>

- Fulford, M. D. (2013, May 1). Practice What You Preach: Using an Experiential Learning Approach to Teach Leadership. *Journal of Leadership, Accountability & Ethics*, 10(2), 81 - 86.
- Georgetown University (n.d.). Students' Experiences with the Georgetown Honor System. <https://honorcouncil.georgetown.edu/students/experiences/>
- Green, C.S., & Bavelier, D. (2006) Effect of action video games on the spatial distribution of visuospatial attention. *Experimental Psychology: Human Perception and Performance*, 32(6), 1465 - 1478.
- Hampshire College (n.d.). Narrative Evaluations: A Portrait of You. <https://www.hampshire.edu/admissions/narrative-evaluations-a-portrait-of-you>
- Hebert, E. (2001). *The power of portfolios: What children can teach us about learning and assessment*. Jossey Bass.
- Keeton, S. (2016, May 1). Effective and Meaningful Grading in Applied Collegiate Voice: Assessing Effort and Progress, a Grading Toolbox, and a Recommendation. *Journal of Singing*, 72(5), 563 - 571.
- Kelleher, C., & Pausch, R. (2005). Lowering the Barriers to Programming: A Taxonomy of Programming Environments and Languages for Novice Programmers. *ACM Computing Surveys* (37), 83–137.
- Kirschner, P., & van Merrinēboer, J. (2013). Do learners really know best? Urban legends in education. *Educational Psychologist*, 48(3), 169-183.
- Kleinman, K. E., & Saigh, P. A. (2011). The effects of the good behavior game on the conduct of regular education New York City high school students. *Behavior Modification*, 35, 95–105.
- Kulkarni, C., Kok Pang Wei, Huy Le, Chia, D., Papadopoulos, K., Cheng, J., ... Klemmer, S. R. (2013, December 1). Peer and Self Assessment in Massive Online Classes. *ACM Transactions On Computer-Human Interaction (TOCHI)*, 20(6), 1 - 31.
- Lancaster, T., & Cotarlan, C. (2021, February 4). Contract cheating by STEM students through a file sharing website: a Covid-19 pandemic perspective. *International Journal for Educational Integrity*, 17(1), 1 - 16.
- Landers, R. N., Bauer, K. N., & Callan, R. C. (2017, June 1). Gamification of task performance with leaderboards: A goal setting experiment. *Computers In Human Behavior*, 71, 508 - 515.
- Litterio, L. M. (2018, October 1). Contract grading in the technical writing classroom: Blending community-based assessment and self-assessment. *Assessing Writing*, 38, 1 - 9.

- Locke, E. A., & Latham, G. P. (2002). Building a practically useful theory of goal setting and task motivation: A 35-year odyssey. *American Psychologist*, 57(9), 705–717.
- Martinez, D. (2020, September 1). A Valuable Tool: Integrating Portfolios into the ESL College Classroom in Puerto Rico. *Delta Kappa Gamma Bulletin*, 87(3), 54 - 62.
- McGonigal, J. (2011). *Reality Is Broken: Why Games Make Us Better and How They Can Change the World*. New York: Penguin Press.
- Min, W., Frankosky, M.H., Mott, B.W., Rowe, J.P., Smith, A., Wiebe, E., ... Lester, J.C. (2020, April 1). DeepStealth: Game-Based Learning Stealth Assessment With Deep Neural Networks. *IEEE Transactions On Learning Technologies, Learning Technologies, IEEE Transactions On, IEEE Trans. Learning Technol*, 13(2), 312 - 325.
- Mittell, J. (2016). Rethinking Grading: An In-Progress Experiment. <https://justtv.wordpress.com/2016/02/16/rethinking-grading-an-in-progress-experiment/>
- Moran T. P. (2016). Anxiety and working memory capacity: A meta-analysis and narrative review. *Psychological bulletin*, 142(8), 831–864.
- Moussa-Inaty, J., Atallah, F., & Causapin, M. (2019, July 1). Instructional Mode: A Better Predictor of Performance than Student Preferred Learning Styles. *International Journal of Instruction*, 12(3), 17 - 34.
- Muñoz, M., & Guskey, T. (2015). Standards-based grading and reporting will improve education. *The Phi Delta Kappan*, 96(7), 64-68. JSTOR
- O'Connor, P., & Cardona, J. (2019, April 1). Gamification: A Pilot Study in A Community College Setting. *Journal of Education*, 199(2), 83 - 88.
- Pacharn, P., Bay, D., & Felton, S. (2012). Impact of a Flexible Evaluation System on Effort and Timing of Study. *Accounting Education*, 21(5), 451–470. Academic Search Complete
- Pamungkas, S. F., Widiastuti, I., & Suharno (2019, November 29). Adapting to Student Learning Style: An Active Experiential Learning Models for Vocational Education in Mechanical Engineering. *AIP Conference Proceedings*, 2194(1).
- Pashler, H., McDaniel, M., Rohrer, D., & Bjork, R. (2008). Learning styles: Concepts and evidence. *Psychological Science in the Public Interest*, 9(3), 105–119.
- Peschl, H. (2020). Full-Time Academic Staff Instructor Application Dossier. <https://taylorinstitute.ucalgary.ca/resources/sample-teaching-philosophy-statements>
- Rowan, T. B., III. (2014). Academic portfolios, holistic learning, and student success in higher education. *US-China Education Review A*, 4(9), 637–645.

- Schultz-Bergin, M. (2019). Experiment Update: Grade Anarchy & Student Learning
<http://schultzbergin.xyz/experiment-update-grade-anarchy-student-learning/>
- Shute, V., Rahimi, S., Smith, G., Ke, F., Almond, R., Dai, C., ... Sun, C. (2021, February 1). Maximizing learning without sacrificing the fun: Stealth assessment, adaptivity and learning supports in educational games. *Journal of Computer Assisted Learning*, 37(1), 127 - 141.
- Stachel, J., Marghitu, D., Brahim, T. B., Sims, R., Reynolds, L., & Czelusniak, V. (2013, March 1). Managing Cognitive Load in Introductory Programming Courses: A Cognitive Aware Scaffolding Tool. *Journal of Integrated Design & Process Science*, 17(1), 37 - 54.
- Stocker, S. L., & Gallagher, K. M. (2019, January 1). Alleviating Anxiety and Altering Appraisals: Social-Emotional Learning in the College Classroom. *College Teaching*, 67(1), 23 - 35.
- Strijbos, J., Narciss, S., & Dünnebier, K. (2010, January 1). Peer feedback content and sender's competence level in academic writing revision tasks: Are they critical for feedback perceptions and efficiency?. *Learning and Instruction*, 20(4), 291 - 303.
- Supiano, B. (2020, October 30). The Cheating Dilemma. *Chronicle of Higher Education*, 67(5), 22 - 27.
- Tahir, R., & Wang, A. I. (2020, January 1). Codifying Game-Based Learning: Development and Application of LEAGUE Framework for Learning Games. *Electronic Journal of e-Learning*, 18(1), 69 - 87.
- TeacherEase (2020). What is Standards-based Grading?
<https://www.teacherease.com/standards-based-grading.aspx>
- Teixeira, A. A. C. (2016, April 1). The impact of class absenteeism on undergraduates' academic performance: Evidence from an elite Economics school in Portugal. *Innovations in Education and Teaching International*, 53(2), 1-13.
- Tychonievich, L. (2012). What to Grade?
<http://www.cs.virginia.edu/tychonievich/blog/posts/244.html>
- Tychonievich, L. (2017). Training Course for Teaching Assistants in Computing.
<https://www.cs.virginia.edu/luther/ta-training>
- Vander Schee, B. A., & Birrittella, T. D. (2021, February 17). Hybrid and Online Peer Group Grading: Adding Assessment Efficiency While Maintaining Perceived Fairness. *Marketing Education Review*, 1 - 9.

Walklet, E., Davis, S., Farrelly, D., & Muse, K. (2016). The impact of student response systems on the learning experience of undergraduate psychology students. *Psychology Teaching Review, 22*, 35–48.

Walvoord, B. E. F., & Anderson, V. J. (1998). *Effective Grading: A Tool for Learning and Assessment*. San Francisco, Calif: Jossey-Bass Publishers.

Ward, E. (2021, April 1). An integrated mixed-methods study of contract grading's impact on adolescents' perceptions of stress in high school English: a pilot study. *Assessing Writing, 48*.