Curriculum and Teaching Methodology (2025)
Clausius Scientific Press, Canada

DOI: 10.23977/curtm.2025.080311
ISSN 2616-2261 Vol. 8 Num. 3

Exploring the impact of online formative assessment on student performance in vocational college english teaching: Insights from a post-pandemic era

Tingting Peng[1,a,*]

[1]School of Humanities and Education, Guangzhou Huanan Business College, No. 300, Changyaoling Changxue Road, Zhongluotan Town, Baiyun District, Guangzhou, 510550, China
[a]346326268@qq.com
**Corresponding author*

Keywords: Online formative assessment, vocational college English teaching, student performance, post-pandemic era, educational practices

Abstract: This study examined the effectiveness of online formative assessment in vocational college English teaching, comparing it to traditional methods. Using a case study approach at Guangzhou Huanan Business College, it analyzed student performance in online and face-to-face courses during the 2022-2023 academic year. The results showed that online formative assessment significantly outperformed traditional methods in in-class, final exam, and GPA gradings. Female students excelled in in-class grading, while males had a slight edge in final exam grading, with no significant difference in GPA. Experienced teachers positively influenced final exam performance, and medicine majors outperformed computer science majors in the online mode. This study suggests that adopting online formative assessment, prompted by the pandemic-induced shift to remote learning, led to better student outcomes compared to traditional face-to-face instruction post-pandemic, offering valuable insights for educational practices and policies in the post-pandemic era.

1. Introduction

The global pandemic has led to notable progress in academic institutions worldwide, especially in the adoption of online learning [1,2]. This shift is also noticeable in the academic community focused on English language education in China, where the swift adoption of online learning has benefited both students and English teachers [3]. The increasing demand for comprehensive, accurate, and personalized student assessment methods in education emphasizes the importance of formative assessment in constructing a blended teaching model post-pandemic.

Formative assessment, or process assessment, was introduced by Scriven [4] and further defined by Sadler [5] as "all activities conducted by teachers and/or students aimed at providing feedback information to adjust teaching and learning behaviors." Black and Wiliam [6] highlighted the effectiveness of formative assessment as a classroom intervention tool. They emphasized its role in assessing students' development and progress throughout the learning process, with a focus on

individual differences and personalized guidance. This approach, widely used in educational pedagogy, has gained significant attention during the pandemic [7]. Online platforms based on formative assessment systems have quickly emerged in Chinese universities, providing new avenues for assessing and enhancing student learning [8]. Chinese college English teaching has also begun to adopt formative assessment systems, capitalizing on its global popularity and acclaim [9,10].

However, past research has predominantly concentrated on the theoretical underpinnings of formative assessment and small-scale experimental course designs, lacking in-depth investigations into large-scale real teaching scenarios and empirical evidence to validate its efficacy in practical settings [11-14].

Due to the impact of the COVID-19 pandemic, Guangzhou Huanan Business College implemented closed school management and an online formative teaching model in the first semester of the 2022-2023 academic year, following the guidelines of the Guangzhou education bureau. As face-to-face teaching gradually resumed in an organized manner in the second semester, this study compares the performance of non-English major vocational English students from the School of Humanities and Education at Guangzhou Huanan Business College in online and face-to-face courses during the 2022-2023 academic year. The study aims to provide empirical evidence supporting the superiority of formative assessment over traditional assessment methodologies.

2. Research Questions and Hypotheses

The primary research questions (RQ) and hypotheses for this study are as follows:

RQ1: In comparison to traditional face-to-face teaching models, does the online teaching model based on formative assessment have advantages in real teaching? This study anticipates that the online model should outperform the face-to-face model in facilitating knowledge acquisition and providing feedback on student learning situations (Hypothesis 1a). Additionally, gender may influence the response to online formative teaching models: female students may exhibit more negative responses to online courses, performing worse than male students (Hypothesis 1b).

RQ2: Does teacher experience impact online formative teaching models? This study predicts that highly qualified teachers can better promote student learning motivation and development, achieving more significant teaching outcomes (Hypothesis 2).

RQ3: Do students from different majors experience varying outcomes in online models? This research expects that students in the computer science major will show more significant improvement compared to other majors (Hypothesis 3a). Furthermore, there should be an interaction between student major and gender: the online model based on formative assessment should be beneficial in enhancing enjoyment and participation for male students in the computer science major, who are more sensitive to digital feedback technology (Hypothesis 3b).

3. Course Design

(1) Course Basic Information: The vocational English course, offered by the School of Humanities and Education, includes two semesters. The first semester course, with the code 22GC030001, was taught online, assessed through in-class quizzes, homework and a final exam, and carried 3.0 credits. The second semester course, with the code 22GC030002, was taught face-to-face, assessed through in-class quizzes, homework and a final exam, and carried 4.5 credits. Both courses were based on the Wisdom English, Workplace English textbook series for higher vocational colleges, published by World Books Publishing Company. The examination and assessment methods were approved by the lead teacher, and there were no changes in the test difficulty.

(2) Online Platform: During the pandemic, in response to the Chinese Ministry of Education's

"suspension of classes but not suspension of learning" initiative in January 2020, the Chaoxing Learning platform was selected as one of the first 22 recommended learning platforms by the Ministry of Education. Our university chose it for online teaching, assignments, and final exams. The link to the South China Business and Trade College Chaoxing Learning platform course website is [http://mooc1.chaoxing.com/course/208084837.html?headFid=5758].

(3) Online Course Design Based on Formative Assessment: All teachers received a 12-week online teaching training course between 2020 and 2021 provided by South China Business and Trade College and Chaoxing Learning platform. The key to designing online courses lay in leveraging the advantages of digital technology. Firstly, by collecting real-time student performance data and generating visual reports, teachers could comprehensively understand students' learning situations. Based on this data, teachers could make accurate assessments and provide personalized feedback, better supporting student learning.

The potential high dropout rates in online courses were addressed by introducing an online attendance mechanism [15]. Students were required to check in and check out at key points, with attendance included in the in-class assessment. This measure, in the context of online learning lacking interaction and timely guidance, could stimulate students' learning enthusiasm and improve motivation.

By utilizing the formative assessment functionality of the online learning system, students' motivation for self-assessment was stimulated, and the method of providing in-class chat feature or a private message to the teacher was introduced to enhance learning efficiency. This strategy helped students better understand their learning progress and adjust their learning methods promptly [16,17]. Furthermore, the digital platform also supported breakout rooms and peer assistance, promoting collaboration and communication to form a robust learning ecosystem.

4. Research Methods

(1) Study Sample, Design, and Ethical Approval: This study collected student administrative data from 10 non-English major classes, comprising 486 first-year students at the School of Humanities and Education, South China Business and Trade College. This study employed a One-Group Pretest-Posttest Design, measuring student English course performance in one group of students before (pretest) and after (posttest) an online learning mode was administered. In other words, students were taught online (the intervention) in the first semester and face-to-face (the control) in the second semester. Our college uses a points-based grading system that encompasses in-class points, a weighted point earned by students in the class, calculated as [20% in-class participation (including four quizzes) + 40% homework (including eight assignments) + 40% essays (two essays)], the final exam point, and grade point average (GPA = 40% in-class + 60% final). Our college does not have midterm exams. Based on GPA, a student’s performance can be graded as follows: High Distinction: 90 and above, Distinction: 80-89, Credit: 70-79, Pass: 60-69, Fail: below 60. The main research hypothesis (RQ1a) is that online formative assessment improves student engagement and achievement. If the average posttest score is worse than the average pretest score, the treatment of online formative assessment may be responsible for the improvement of student course performance. Other collected data included information such as the teaching department, course name code, teachers’ names, assessment method, credit hours, student names, genders, student IDs, departments, and majors. Information on absenteeism (deferred exams, absences, exemptions, cheating), and the total number of students who attended the exams was also included.

In this investigation, human research participants were involved, and ethical considerations were approved by the ethics committee at the South China Business and Trade College (No.: S2023-2-12). Given the retrospective nature of this study, the informed consent was waived by the ethics

committee. All individuals, including both students and teachers who participated, have undergone de-identification in the collected data.

(2) Statistical Analysis and Graphing: The student course performance (in-class, final, and GPA gradings) were compared between the online mode and the face-to-face mode using Wilcoxon signed-rank test. To determine if differences in gender, teacher, or student major contribute, the improvement of student course performance was calculated as [Δx = online mode student course performance – face-to-face mode student course performance]. Gender differences were compared using Mann Whitney test. Teacher differences and student major differences were compared using Kruskal-Wallis test. Statistical analysis and graphing were performed using GraphPad Prism (Version 10.1.1). The analysis and graphing of the interaction between student major and gender employed the General Linear Mixed Effects Model (GLMM), conducted using IBM SPSS statistical analysis software (Version 29.0.0.0). The data supporting the results of this study is available from a research data repository [18].

5. Results

(1) An Overview: After excluding students who were absent, a total of 456 pairs of valid data were included in this research cohort, representing the paired gradings for the first semester (online mode) and the second semester (face-to-face mode) of the 2022-2023 academic year. Among them, there were 246 male students and 210 female students. There were a total of 8 teachers, and for 22-Administrative Class: Traditional Chinese Medicine Class 1, the teacher who conducted the course in the first semester was unable to continue in the second semester, and the course was completed by three different teachers sequentially. For 22-Administrative Class: Urban Rail Transit Operation Management Class 1, the in-class gradings for the first semester were lost due to a computer system upgrade, but the final gradings were retained and valid for both semesters. The students' majors included Traditional Chinese Medicine, Nursing, Traditional Chinese Medicine Rehabilitation Technology, Computer Network Technology, Big Data and Accounting, Financial Services and Management, and Urban Rail Transit Operation Management. Based on the situation of the major departments, student majors were categorized into three main groups: Medicine (including Traditional Chinese Medicine with 1 class, Nursing with 2 classes, Traditional Chinese Medicine Rehabilitation Technology with 1 class), Computer (including Computer Network Technology with 2 classes, Big Data and Accounting with 1 class, Financial Services and Management with 1 class), and Metro (Urban Rail Transit Operation Management with 2 classes).

(2) Data Normality Test: The normality of continuous variables in this study (Online: in-class, final, and GPA; Face-to-face: in-class, final, and GPA) was tested using Shapiro-Wilk test. The results indicated that none of the above variables followed a normal distribution ($P<0.0001$). Therefore, non-parametric statistical methods were chosen over parametric statistical methods for this study.

(3) Improved Student Course Performance in Online Mode Compared to Face-To-Face Mode: The results of this study revealed that students' course performance in the face-to-face mode was significantly worse than in the online mode. This was observed in in-class grading, which decreased from the online mode (median: 89, 95% Confidence Interval (CI): 88-90) to the face-to-face mode (86, 95% CI: 85-87), with a P-value of 0.0047 (two-tailed). Final exam grading also decreased from the online mode (84, 95% CI: 82-84) to the face-to-face mode (79.5, 95% CI: 78-80), with a P-value of <0.0001 (two-tailed). Correspondingly, GPA decreased from the online mode (85, 95% CI: 83-86) to the face-to-face mode (81, 95% CI: 80-83), with a P-value of <0.0001 (two-tailed). Significances were determined by Wilcoxon paired signed-rank test. Symbols and error bars represented the median and 95% confidence interval. *: $P<0.05$, **: $P < 0.01$, ***: $P < 0.001$, and

****: P < 0.0001. This annotation style is consistent across all figures in this manuscript. These findings provide empirical evidence supporting the superiority of the online mode over the traditional face-to-face mode, confirming Hypothesis 1a. Figure 1 shows the before-and-after plots.

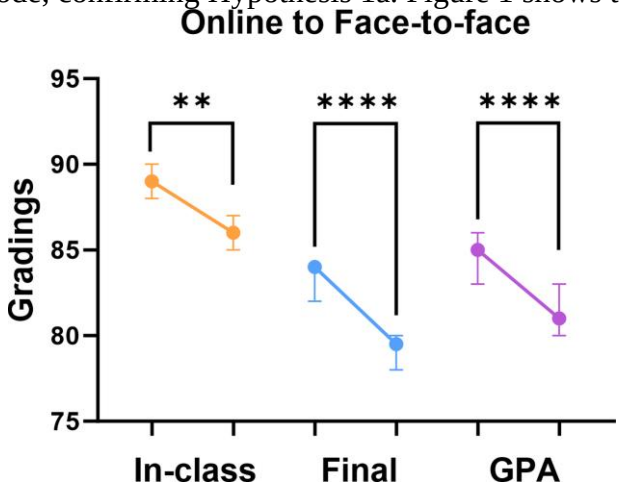

Figure 1 Improved student course performances in the online mode compared to the face-to-face mode.

(4) Gender Differences in Student Course Performance: Female students demonstrated a greater improvement in in-class grading (Δx) compared to male students (females: 2, 95% CI: 1-3 vs. males: 0, 95% CI: -1 to 1; Mann-Whitney test P=0.0025, two-tailed). However, male students showed marginal superiority over female students in the improvement of final exam grading (Δx) (males: 4, 95% CI: 2-6 vs. females: 2, 95% CI: 1-4; P=0.0501, two-tailed), leading to no significant difference in the improvement of GPA (Δx) between the two genders (males: 3, 95% CI: 1-4 vs. females: 2, 95% CI: 1-4; P=0.5263, two-tailed). Figure 2a illustrates the gender differences in student performance improvement (Δx). This suggests that, in the online mode, female students (circle) had an advantage in in-class assessment, while male students (square) marginally outperformed females in final exam grading, resulting in no significant difference in GPA. These findings indicate that, although there are assessment-specific differences by gender, the online format with formative assessment benefitted the learning abilities of all students regardless of gender. Therefore, Hypothesis 1b is not confirmed.

(5) Teacher Differences in Student Course Performance: Some experienced teachers achieved better student engagement and achievement in the online mode. Specifically, Teacher 2, with over 20 years of experience and superior adaptation in formative assessment training, excelled in instructing four classes with a median student performance improvement (Δx) of 4 (95% CI: 2-8). This surpassed the performance of Teacher 1, with 5 years of experience, instructing two classes with a median (Δx) of 2 (95% CI: -1 to 6), as well as Teachers 3 and 4, with 3 years and 5 years of experience respectively, co-teaching three classes with a median (Δx) of 2 (95% CI: 0-4). The teachers' performance showed a statistically significant difference (Kruskal-Wallis test (2, 400) = 8.147, P=0.017; with Dunn's multiple comparison test: Teacher 2 significantly differed from Teachers 3 and 4 after adjustment, p=0.0326; no significant difference between Teacher 2 and Teacher 1, as well as between Teachers 3 and 4 and Teacher 1; insignificant p-values omitted here). See Figure 2b for the teachers' performance. This result supports the finding that, under the premise of effective formative assessment training for all teachers involved in the online mode, more significant improvements for students can be attributed to the higher teaching quality of experienced teachers. It also reinforces the understanding of establishing expert classrooms and enhancing training and skill improvement for younger teacher teams. Therefore, Hypothesis 2 is

confirmed.

(6) Student Major Differences in Student Course Performance: In the online mode, students in the Medical Department showed significantly greater performance in in-class grading compared to those in the Computer Science and Metro Management Departments. The median of student performance improvement (Δx) for medical students was 4 (95% CI: 3-4), while it was 1 (95% CI: -2 to 3) for Metro students and -2 (95% CI: -3 to -1) for Computer Science students. There were significant differences among the three majors (Kruskal-Wallis test (2, 419) = 81.24, $P < 0.0001$). Dunn's multiple comparisons indicated that the improvement of student performance (Δx) for medical students was significantly higher than for the other two majors (Medicine vs. Metro adjusted p=0.0068, Medicine vs. Computer Science adjusted $p < 0.0001$), while there was no significant difference between Metro and Computer Science (p=0.1146). See Figure 2c.

There were no significant differences in the student performance improvement (Δx) of final exam grading among the three majors (P=0.433), and multiple comparisons showed no differences (insignificant p-values omitted here). See Figure 2d.

For the student performance improvement (Δx) in GPA, there were significant differences among the three majors (Kruskal-Wallis test (2, 419) = 17.16, $P = 0.0002$). Multiple comparisons indicated that medical students' performance improvement (Δx) was significantly higher than Computer Science (adjusted p=0.0001), while there was no significant difference between Medicine and Metro, or between Metro and Computer Science (insignificant p-values omitted here). See Figure 2e.

In summary, while online mode effectively enhances the performance of students in all majors, medical students outperformed computer science students in in-class and GPA gradings. This finding suggests that proficiency in information and communication technology (ICT) applications does not necessarily determine student performance in online mode. Therefore, Hypothesis 3a is not confirmed.

(7) Contribution of Gender Composition Differences Among Student Majors to Student Course Performance in Online Mode: The gender ratio of medical students (female : male=1.6) was higher than that of computer science students (female : male=0.5) and metro management students (female : male=0.32). The gender composition of students varies greatly among different majors, which raised the question whether both gender and student major contributed to student course performance in online mode, and whether there was an interaction effect between the two? Since student major and gender are independent factors and both are categorical variables, this study utilized the General Linear Mixed Effects Model (GLMM) to further analyse the impact of different gender ratios among majors on the student course performance in online mode. The GLMM model analysis considered in-class grading as the dependent variable, with student major, gender, and the interaction term between student major and gender as fixed factors to test between-subject effects and interactions. The results indicated that different student majors had a statistically significant impact on in-class grading ($F(2, 419) = 41.048$, $P < 0.001$). The effect of student gender on in-class grading did not show statistical differences ($F(1, 419) = 1.272$, $P = 0.260$). There was a weak interaction between student major and gender that did not reach statistical significance ($F(2, 419) = 2.603$, $P = 0.075$). In other words, in the online mode, student major had a more significant impact on course performance, while the impact of gender was relatively small, and there was not a clear interaction between the two. See Figure 2f for the interaction effect between student major and gender. Therefore, Hypothesis 3b is not confirmed.

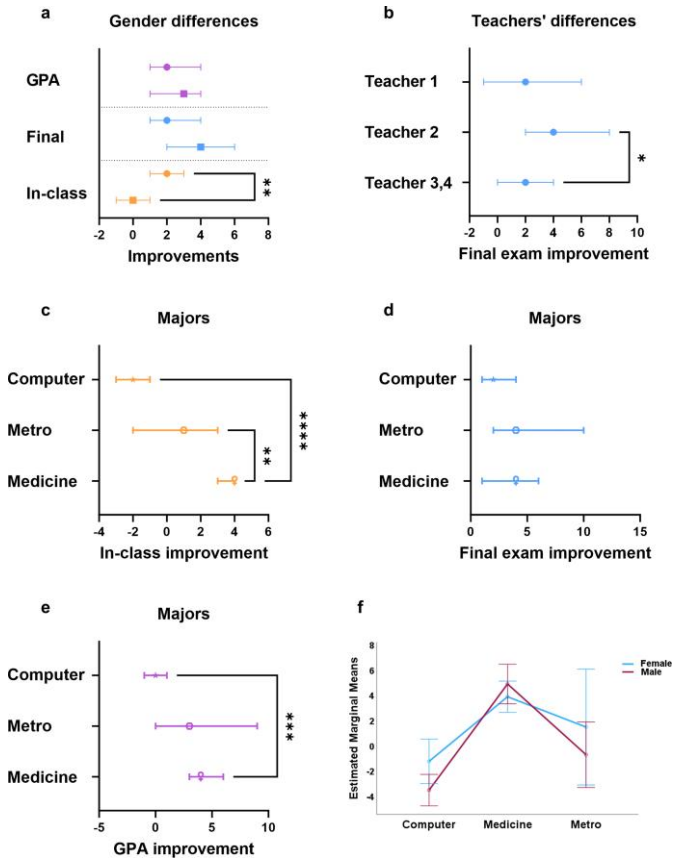

Figure 2 Online mode student course performance influenced by student genders, teachers, and student majors.

6. Conclusion

This study compared online formative assessment with traditional face-to-face instruction in vocational college English teaching, finding significant performance improvements in the online mode across in-class, final exam, and GPA grading. The evidence supports a hybrid evaluation system combining formative and summative assessments to enhance learning outcomes and student autonomy. The success of online modes is attributed to factors like real-time feedback, digital participation mechanisms, and flexibility. The role of experienced teachers was critical, suggesting ongoing professional development is essential. Medical students' superior performance indicates discipline-specific adaptability, but ICT proficiency alone did not determine success. These insights argue for scalable integration of formative digital methods in vocational curricula and investment in teacher training and platform development to ensure quality and engagement in post-pandemic education.

Acknowledgement

This work was funded by the Foreign Language Association, Guangzhou, China, under the Foreign Language Teaching Reform Project (Grant ID: GFSA202318).

References

[1] Turnbull, Darren, Chugh, Ritesh, & Luck, Jo. (2021). Transitioning to E-Learning during the COVID-19 pandemic: How have Higher Education Institutions responded to the challenge? Education and Information Technologies, 26(5),

6401-6419. https://doi.org/10.1007/s10639-021-10633-w
[2] Saha, Bijoya, Atiqul Haq, Shan Md, & Ahmed, Khandaker Jafor. (2023). How does the COVID-19 pandemic influence students' academic activities? An explorative study in a public university in Bangladesh. Humanities and Social Sciences Communications, 10(1), 602. https://doi.org/10.1057/s41599-023-02094-y
[3] Chen, Shaoying, & Shen, Tong. (2024). Construction of College English Blended Teaching Models and Its Reflection. Heilongjiang Researches on Higher Education, 4, 81-88.
[4] Scriven, Michael. (1967). The Methodology of Evaluation. In Perspectives of Curriculum Evaluation, AERA Monograph Series on Curriculum Evaluation (1 ed., pp. 39-83). Rand McNally.
[5] Sadler, D. Royce. (1989). Formative Assessment and the Design of Instructional-Systems. Instructional Science, 18(2), 119-144.
[6] Black, Paul, & Wiliam, Dylan. (1998). Assessment and Classroom Learning. Assessment in Education: Principles, Policy, and Practice, 5(1), 7-74.
[7] Asamoah, Daniel, Shahrill, Masitah, & Abdul Latif, Siti. (2022). A Review of Formative Assessment Techniques in Higher Education During COVID-19. The Qualitative Report, 27(2), 475-487.
[8] Su, Hong. (2020). Educational Assessment of the Post - Pandemic Age: Chinese Experiences and Trends Based on Large-Scale Online Learning. Educational Measurement, Issues and Practice, 39(3), 37 - 40. https://doi.org/https://doi.org/10.1111/emip.12369
[9] Zhang, Shuguang. (2017). Implications of Formative Assessment for Teaching in College English Majors. Journal of Chifeng University (Philosophy and Social Science Edition), 38, 163-165.
[10] Hu, Hongzhi, & Liu, Lin. (2022). Research on Formative Assessment of College English Based on the "Online + Offline" Blended Teaching Model. Journal of Shijiazhuang University, 24, 133-136.
[11] Vonderwell, Selma Koc, Boboc, Marius. (2013). Promoting Formative Assessment in Online Teaching and Learning. TechTrends,57,22–27. https://doi.org/10.1007/s11528-013-0673-x.
[12] Chen, Qiuxian, May, Lyn, Klenowski, Val, & Kettle, Margaret. (2014). The enactment of formative assessment in English language classrooms in two Chinese universities: teacher and student responses. Assessment in Education-Principles Policy & Practice, 21(3), 271-285.
[13] Cai, Zhe. (2018). An Empirical Study on the Flipped College English Classroom Teaching upon Outcome Based Education. 2018 3rd International Seminar on Social Science and Humanistic Education (Sshe 2018), 308, 41-45.
[14] Ismail, Seyed M., Rahul, D. R., Patra, Indrajit, & Rezvani, Ehsan. (2022). Formative vs. summative assessment: impacts on academic motivation, attitude toward learning, test anxiety, and self-regulation skill. Language Testing in Asia, 12(1), 40. https://doi.org/https://doi.org/10.1186/s40468-022-00191-4
[15] Ginting, Daniel, Woods, Ross, Tantri, Niki Raga, Rahayu, Puji Sri, & Asfihana, Raida. (2022). Portraying the Performance of Indonesian's Massive Open Online Course Facilitators. Sage Open, 12(3).
[16] Guamán-Tumbaco, Ana, Vargas-Caicedo, Estefanía, & Villagómez-Bajaña, Luis. (2020). Quizizz as a Formative Assessment Tool and Its Effectiveness in Teaching Vocabulary and Grammar in English as a Foreign Language Classrooms: A Comparative Study. 14th International Technology, Education and Development Conference (Inted2020), 4493-4498.
[17] Yang, Li Francoise, Liu, Yanhong, & Xu, Zhiqing. (2022). Examining the effects of self-regulated learning-based teacher feedback on English-as-a-foreign-language learners' self-regulated writing strategies and writing performance. Frontiers in Psychology, 13. https://doi.org/10.3389/fpsyg.2022.1027266
[18] Peng, Tingting (2024). 2022-2023 academic year first and second semester Higher Vocational English grades (raw and cleaned data). In (V1 ed.): Harvard Dataverse. https://doi.org/10.7910/DVN/5SYK2M