

Educational Stratum: Layering Student Performance with Supplementary Materials

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Abstract

Selecting an appropriate textbook for courses in higher education is a difficult task that can often result in negative outcomes for both educators and students. Supplementary materials, however, have a number of advantages that can be used to provide students with an opportunity for extended learning. This study compares the performance of several cohorts of students at two universities taught by the same teacher. One university used the same text over many years but gradually added more challenging supplementary materials; the other replaced the textbook each year. Preliminary findings suggest that the latter resulted in poorer performance. Further investigation could have implications for course designers.

キーワード : Textbook / supplementary materials / student performance

Introduction

The factors that account for student performance are myriad: innate ability, motivation, socio-economic positioning, engrained cultural values vis-à-vis education and so on. Further complexity arises in the calculus of student performance as it is entirely possible that these variables are idiosyncratic in the sense that they may take on different values depending upon the country – or perhaps even the city – in which the study is being conducted.

With respect to quantitative modelling in education, one can note quite comfortably that factor x may be correlated with factor y but inferring causality from the two – including the logical conditions of necessity and sufficiency – may be a much more difficult task. Nevertheless in our role as educators, knowing that two factors are correlated may be grounds enough to base corrective action upon the underlying policies: that is correlation may be *sufficient* for an institutional response.

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2016 appears to have been a challenging year for some of Hokuriku Gakuin University's students with respect to performance vis-à-vis the new English textbooks. Textbook selection is a critical decision in many organisations as it often becomes the keystone of the respective course. Choosing an appropriate textbook is a complicated affair that must take into account a number of trade-offs. One should not, however, underestimate the value of supplementary materials as these can clarify, reiterate, and reinforce the core messages the textbook is attempting to convey. The literature shows that the use of supplementary material is often positively correlated with student performance and is true across many subject fields. This article examines a sample of literature with respect to supplementary material and will present a case that shows an evolutionary approach to material development at the very least does not degrade student performance. In doing so, this article aims to promote discussion about how future courses could potentially benefit from designs that are less 'text-centric'.

Literature review

In many subjects, the textbook is often perceived as the central core; Sheldon (1988) describes it at the

“visible heart of any ELT program” (p.237). Cunningsworth (1995) also makes several observations, textbooks are the primary form of learning, provide activities for learners, and can assist less experienced or confidence-lacking teachers. Lamie (1999) maintains that despite the changes in technologies, there is still a high demand for textbooks. Part of this claim can be evidenced by Penny (1996) who notes that without a text students may feel that the course has no purpose or that their learning is not being taken seriously. Twenty years later, this statement still holds true in many contexts. For the foreseeable future at least, the textbook will likely remain the centrepiece for many courses.

Nevertheless, instructor perceptions of the textbook can range from a critical guide for student learning to a necessary evil that must be accepted (Awasthi, 2006). In the latter cases, Sheldon (1988) empathises, stating that “when a textbook is imposed on both parties (students and teachers) by a higher authority, and when there is no possibility of change or modification, the discontent is no less acute for being futile” (p. 238). He continues by suggesting that the selection of textbooks often carries a degree of financial, professional, and political investment. Speaking of political investment, it is not an uncommon practice in some fields for the tenured professor to specify his or her own textbook as the required reading. Anecdotally, ELT classes do not appear to suffer from quite the same degree of moral hazard but in doing so it highlights the matter of choosing an appropriate text.

What this implies therefore, is that textbook selection is not just a trade-off between institutions and students vis-à-vis what is educationally desirable and what is financially feasible (Sheldon, 1988), but also a trade off on an intra-organisational level: one that must weigh the advantages of a more centralised approach to selection or a more autonomously delegated one. In this respect, the process of textbook selection creates an overlap between education theory, economics (approachable via optimisation and utility theory), and organisational behaviour theory. Given the complexities this creates, it is no small wonder that

dissatisfaction with selected texts is still a current problem—see Rahimpour (2011) for an example. Part of this dissatisfaction can be explained by Wen-Cheng, Chien-Hung & Chung-Chieh (2011), who suggest that in the face of such complexity, the selection process often results in two polarised outcomes: asking so many questions the process is never complete, or choosing a text almost at random.

One of the critical issues for EFL students is that the textbook often becomes the representative method in which material is delivered: meaning that student learning is hobbled to whatever content the textbook covers (Awasthi, 2006). For this reason, the debate about authentic materials (materials designed by native speakers for consumption in the same language) is a lively one: proponents argue their use exposes students to the ‘real world’ target language, its culture, and increases student motivation (Richards, 2001). Nevertheless, authentic materials can present a challenge for educators in lower levels (ibid) and are, by definition, culturally biased (Martinez, 2002). These differing views give rise to questions about when and where to incorporate authentic materials into a text. Assuming the publisher takes this into account, it also further complicates the selection process by adding yet another dimension to the (already complicated) selection criteria: finding such a book. This complexity, however, can be reduced in part by incorporating supplementary materials into the syllabus. Supplementary materials are adjuncts to the text, often compiled by the respective educational provider and thus better tailored to suit local needs (Sheldon, 1988). They are also much timelier as there are considerable publishing delays in academic texts (ibid).

There are a number of studies that demonstrate the advantages of using supplementary materials in addition to the core text as opposed to solely focusing on a single book. Adbous (2012) performed an experiment on podcasts, including them as part of the core material for one group, and as supplementary material for a second group. The results showed that the group who were given podcasts as supplementary

materials performed better than the other group. Al-Jarf (2004) studied two EFL writing groups where the control group conducted writing tasks in the 'traditional' sense, and the experimental group was taught using a hybrid approach that included web-based instruction on writing. Even though the control group's pre-test scores were higher, the experimental group out-performed the control group in post-testing. Alshumaimeri and Almasri (2012) studied the effects of using WebQuests with respect to reading comprehension. Their experimental group received the same materials the control group did, but with the addition of WebQuest supplementary activities. They found that the experimental group's post-test score was significantly higher than the control group¹. Brinton and Gaskill (1978) taped copies of the BBC's 'News of the Week' and found that students understood broadcasts better, showed more interest in the issues discussed, recycled vocabulary, and exhibited greater understanding of the target culture and governance.

Nevertheless, determining what goes into the supplementary materials must also be considered. Hsu & Min (2008) studied the effects of 'reading-plus-vocab' exercises against 'narrow reading' exercises. Distinguishing these methods is as follows: both student groups were given a text on a topic (robotics in this case), the 'reading-plus-vocab' group then received exercises that focused on the vocabulary present in the text. The other group were given further articles to read on the same subject. Their findings showed that the 'reading-plus-vocab' group performed better than the 'narrow reading' group. It seems, therefore, that reinforcing the initial text is a superior method to assigning more readings on the same subject.

The overall message assembled from the preceding literature can be summarised as follows: textbooks are a key component of ELT courses but choosing the right one is a labour-intensive process that can often result in unsatisfactory outcomes. The inclusion of supplementary materials, however, has been shown to produce better performance vis-à-vis those who were

supplied only with the core text.

One matter that has yet to be examined in quite the same detail is the gradual inclusion of increasingly challenging supplementary material as the *teacher* becomes more familiar with a particular text. Wen-Cheng, Chien-Hung & Chung-Chieh (2011) argue that textbooks have a mediating effect on teacher skill levels, stating that "novel advances (in teaching skill) occur only with individual potential or circumstances with fewer limiting factors" (p. 93). It is here that the author introduces a brief analysis of student performance at two different institutions of higher learning: one where the textbook was the same over a number of years but supplementary materials of increasing difficulty were introduced over time; and a second institution where the textbook was altered but supplementary materials were not included.

Background for analysis

The University of Waikato has a joint programme with Zhejiang University City College (ZUCC) in China. Students study towards a degree in business management in China for two years then travel to New Zealand and complete their degree. One of the courses delivered at the ZUCC campus is an introductory microeconomics course. Between 2010 and 2012, the core textbook was kept the same (Principles of Economics, by N. G. Mankiw) but supplementary materials were incorporated. Over these three academic years, the materials grew slowly in complexity: introducing the mathematics behind the conceptual descriptions in the text, and exploring entire new concepts not covered in the text itself.

Hokuriku Gakuin University (HGU) provides courses in English language education, stratifying students based on their abilities. Between 2015 and 2016 the core textbook for two particular classes at the same level between years was changed to English in Common 6 from lower level texts in the same series. Within the data set in this paper, the textbook and its attendant workbook comprised the entirety of materials provided to the students.

Data for this study were taken from student assessment

sheets, including intra-semester tests and final exams. This involved 205 students studying microeconomics at ZUCC (46 in 2010, 79 in 2011, and 80 in 2012) and 40 students studying English at HGU (24 in 2015, and 16 in 2016). All students in both schools were taught by the same teacher.

ZUCC grade analysis

At ZUCC it was a matter of policy not to grade to a curve. Papers were marked blind and scalar metrics were not applied. As a result, what one sees in the following diagrams reflects the raw outcomes. Figure 1 shows the raw distribution of final grades per decile over the three years of data collection. Trend lines are based on Order Four polynomial equations.

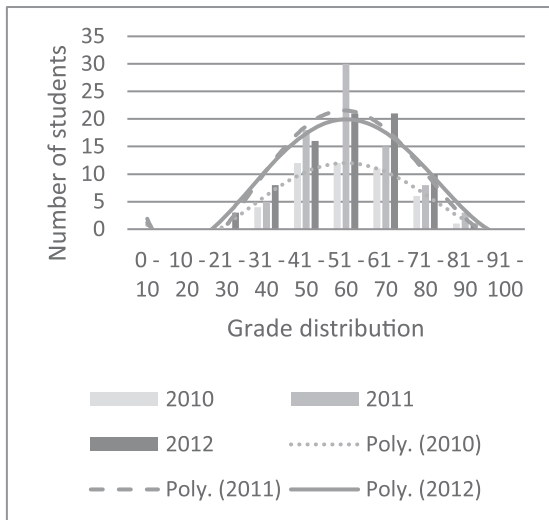


Figure 1 Number of students per decile: ZUCC

As one can see, the figures centre on the 51-60 percent range. The University of Waikato’s papers are based on a 50% pass. Scores of 80% and above are considered excellent. Even though the number of students is relatively low, one still sees the typical bell-curve distribution arising. For easier intertemporal comparison, Figure 2 presents the data as the proportion of students per decile.

The three cohorts display very similar curves despite the course material gradually increasing in difficulty. The mean averages for the three years, respectively, are 55.68%, 56.02%, and 55.80%.

The economics course includes two intra-semester

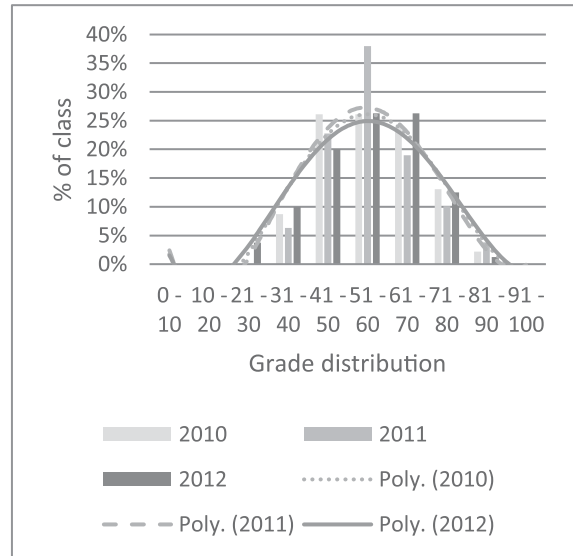


Figure 2 Proportion of students per decile: ZUCC

tests in addition to a final exam. This presents an opportunity to measure the difference in scores from respective test to final exam, which serves as a proxy for pre and post testing in ELT literature as the same concepts appear in the exam as in the test. The following diagrams chart the difference in exam scores and test scores with the notation E-T 1 meaning the exam score minus test 1, E-T 2 meaning the exam score minus test 2. Plotting this on a Euclidean plane allows one to see improvements. With respect to the origin: north-east represents students who performed better in the exam than both test 1 and test 2 ; south-west represents students who performed worse in the exam than both test 1 and 2; north-west implies the exam score was better than test 2 but worse than test 1; and south-east implies the exam score was better than test 1 but worse than test 2.

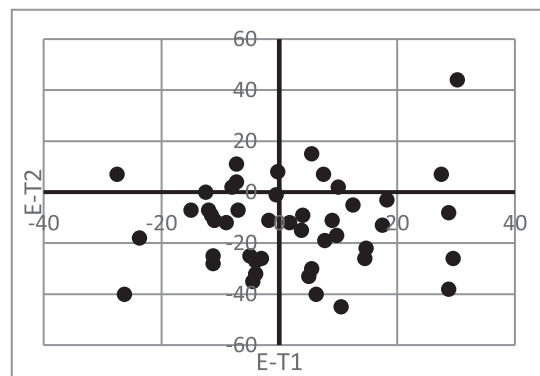


Figure 3 Exam/test improvements 2010

Figure 3 shows a fairly chaotic spread but importantly there are only a handful of students whose exam score was better than both tests.

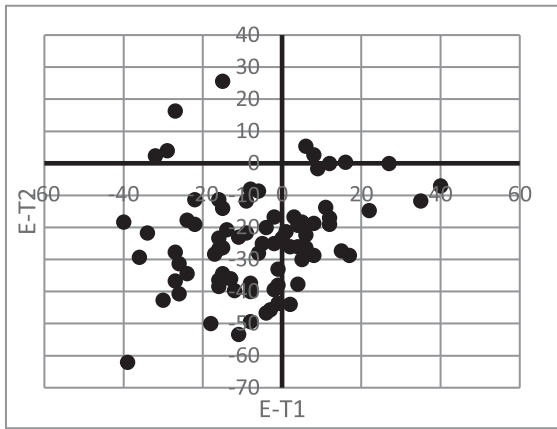


Figure 4 Exam/test improvements 2011

As shown in Figure 4, 2011 displays a tighter clustering of scores in comparison to 2010. Of concern, however, is how most students performed worse on the exam than in their tests.

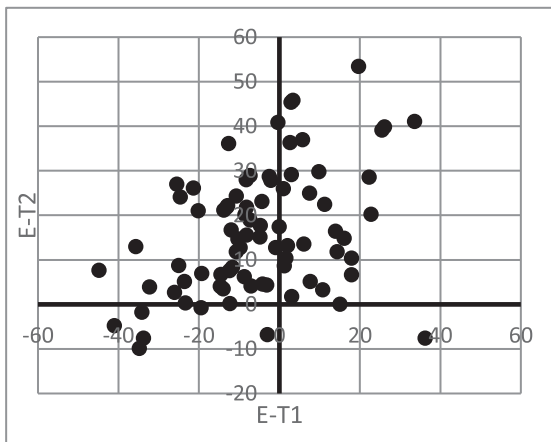


Figure 5 Exam/test improvements 2012

2012 sees many students perform better in the final exam than test 1 and test 2. Other students did better than test 2 but worse than test 1 (see Figure 5).

Figure 6 presents a compound image of the three years of data. It is interesting to note that 2011 and 2012 scores are more tightly packed than 2010. Generally 2012 shows much greater performance improvements than the other years but one must note that new exams were written every year and thus drawing conclusions from these findings must be considered tentatively.

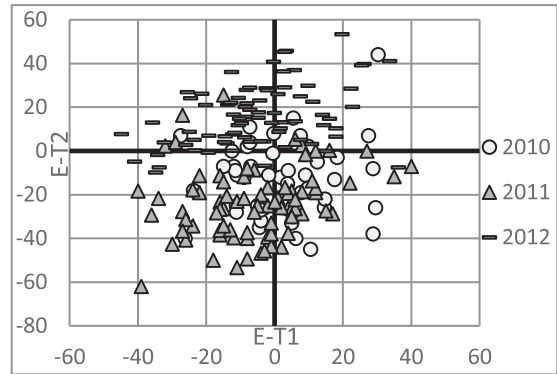


Figure 6 Exam/test improvements 2010-2012

HGU grade analysis

As with ZUCC, it is not a matter of policy to grade to a curve at HGU. Having fewer students implies that outlying values have a greater impact upon overall variance but in the interests of consistency are displayed in the same format as ZUCC grades.

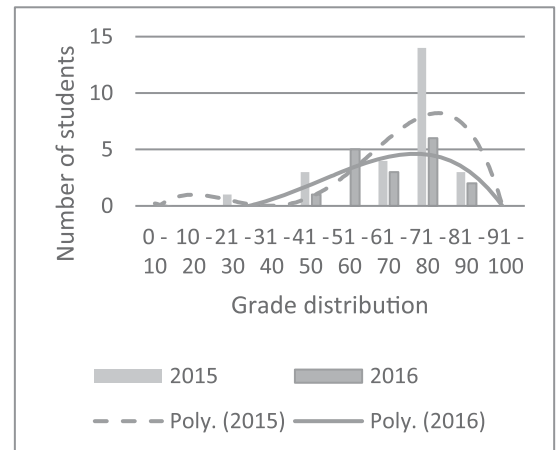


Figure 7 Number of students per decile: HGU

Once again, the data are easier to compare when dealing with proportions.

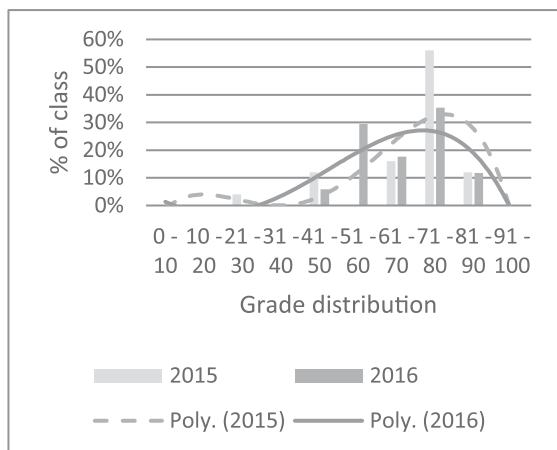


Figure 8 Proportion of students per decile: HGU

The overall class average for 2015 was 68.83%, whereas for 2016 it was 66.34%. There is a greater difference in the averages here than in the ZUCC grades despite 2015 having a number of outlying students on the lower side of performance (owing to not completing coursework). Removing these outlying data, the average for 2015 rises to 73.4%.

Comparative analysis

One feature common to both the courses offered at ZUCC and HGU is the presence of an intra-semester test. At ZUCC there were two but at HGU there was only one. Still, this presents an opportunity to chart the differences in grades from test to exam (see Figure 9)

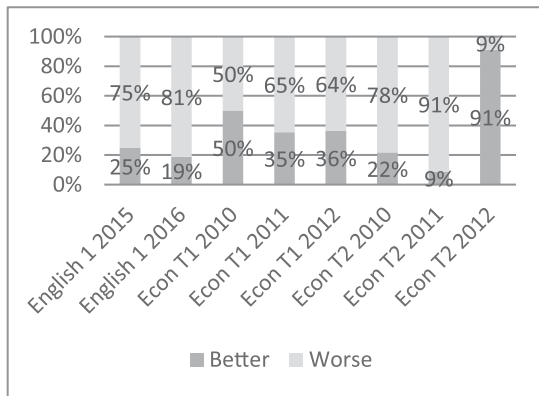


Figure 9 Comparison of test to exam performance

The two columns on the extreme left are the HGU English courses. The 2016 cohort (who used a higher level text) shows a smaller proportion of students improving their performance on the exam vis-à-vis the mid-term test than the 2015 cohort. Exam/test improvement for ZUCC students is more variable, but in all but one instance a greater proportion of students improved their scores in the exam over the respective test.

Discussion and limitations

In terms of an overarching comparison, one might suggest that the introduction of a more challenging textbook in the HGU English programme had a negative effect upon outcomes. The introduction of more challenging supplementary material in the ZUCC economics programme, however, does not display the

same reduction in performance. There are some very minor improvements in class averages but these are small enough to be insignificant.

The analysis here is only a cursory one, and is limited by examining just two institutions. There are, of course, a large number of factors at work that can influence student performance. The data also is not ideal for experimental purposes as a pre and post-test method would be preferred. Other factors to note are that the subjects are different, as are the countries. The findings here should therefore not be considered as definitive by any stretch but they do present an interesting notion that could form the basis of a future study: a longitudinal analysis that holds the textbook constant for one stream of students with attending supplementary materials, and a second stream whose textbook is replaced or rotated periodically.

Concluding remarks

Despite these limitations it is still interesting to note that consistently using the same textbook as a pedagogical foundation and challenging the students through supplementary materials was *not* associated with *decreasing* performance. If more in-depth research is conducted and corroborates the findings offered here, it may have potentially beneficial implications for course designers. Relying on the same textbook(s) for an extended period of time reduces the search costs involved in sourcing texts. Another way to view the search problem is that if it need be conducted less frequently than current policy mandates, the payoff associated with good choice can be extended further into the future. As noted earlier, authentic materials are published much more frequently than textbooks and in many cases fall under Creative Commons or Fair Use clauses of copyright law². The marginal costs associated with these materials may therefore be very small too. The collective accumulated mass of supplementary material can also be recycled from cohort to cohort. Finally, if future cohorts are to use the same textbook as current students, it creates a market for second hand texts, and therefore the initial outlay is no longer a

sunk cost. In doing so, this increases the window of financial feasibility and thus also loosens selection constraints. Layering the course with an evolving range of supplementary materials based on a foundation textbook may therefore be an attractive option for both the institution and the student.

- 1 Although one caveat they note is that instructors and students need to be trained how to use WebQuest effectively
- 2 TED, for example, actively *encourages* educators to download their presentations and display them in classes.

References

- Abdous, M. H., Facer, B. R., & Yen, C. J. (2012). Academic effectiveness of podcasting: A comparative study of integrated versus supplemental use of podcasting in second language classes. *Computers & Education*, 58 (1), 43-52.
- Alshumaimeri, Y. A., & Almasri, M. M. (2012). The effects of using WebQuests on reading comprehension performance of Saudi EFL students. *TOJET: The Turkish Online Journal of Educational Technology*, 11 (4).
- Al-Jarf, R. S. (2004). The effects of web-based learning on struggling EFL college writers. *Foreign Language Annals*, 37 (1), 49.
- Awasthi, J. R. (2006). Textbook and its evaluation. *Journal of NELTA*, 11 (1-2), 1-10.
- Brinton, D., & Gaskill, W. (1978). Using news broadcasts in the ESL/EFL classroom. *TESOL Quarterly*, 403-413.
- Cunningsworth, A. (1995). *Choosing your coursebook*. Oxford: Heinmann.
- Hsu, W., & Min, H. (2008). The impact of supplemental reading on vocabulary acquisition and retention with EFL learners in Taiwan. *師大學報. 人文與社會科學類*.
- Lamie, J. M. (1999). Making the textbook more communicative. *The Internet TESL Journal*, 5(1). Retrieved from <http://iteslj.org/>
- Martinez, A. (2002). Authentic materials: An overview. *Karen's linguistic Issues*.
- Rahimpour, M., & Hashemi, R. (2011). Textbook selection and evaluation in EFL context. *World Journal of Education*, 1 (2), 62.
- Richards, J. C. (2001). *The role of textbooks in a language program*. Cambridge: Cambridge University Press
- Sheldon, L. E. (1988). Evaluating ELT textbooks and materials. *ELT journal*, 42 (4), 237-246.
- Ur, P. (1996). *A course in language teaching: Practice and theory*. Cambridge: Cambridge University Press.
- Wen-Cheng, W., Chien-Hung, L., & Chung-Chieh, L. (2011). Thinking of the textbook in the ESL/EFL classroom. *English Language Teaching*, 4 (2), 91.

