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Hands-on / hands-off: Alternative approaches to data-driven learning.

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Abstract

One of the most apparent obstacles to DDL is the use of the technology itself – the computer with its query software and interfaces for accessing electronic corpora. Where this is the case, the obvious question is whether the computer can be successfully removed from the equation without losing the benefits of the overall approach. In the present study, two groups of lower-intermediate level learners at an architectural college were introduced to an English language corpus both ‘hands on’ and ‘hands off’. The learning outcomes of the two approaches were tested, and compared against feedback obtained at the start and again at the end of the course. The general conclusion is that paper-based DDL does represent a viable option: there is unlikely to be a single best version of DDL for all learners in all situations at all times, and variety and sensitivity to learner variation and local conditions is crucial.

1. Introduction

One striking feature of research into corpus use for language learning is the considerable variety of practices and techniques covered under the blanket heading of “data-driven learning” (DDL), a term borrowed from computer science by Tim Johns in 1990. The choice of term itself is not uncontroversial – possibly deliberately so, as the initial intention seems to have been to present the underlying concepts as “radical” (Johns 1988: 21), “innovative and possibly revolutionary” (Johns 1991: 27). This perhaps reflected an attempt to encourage people to question existing practice, and to return learner and language to centre stage, as in one of his most quoted phrases: “What distinguishes the DDL approach is the attempt to cut out the middleman as far as possible and to give the learner direct access to the data” (Johns 1991: 30). There is some indication that Johns (2002: 107) may have regretted the expression later on as DDL became, in the minds of some people, associated exclusively with its most extreme form of hands-on, autonomous, serendipitous corpus exploration, which may be difficult to implement in “the reality of ELT classrooms” (Mukherjee 2006: 14). Further, the radical label may even have contributed to a lack of take-up among a wider community of language teachers and learners (Boulton forthcoming). To adopt Römer’s (2010: 28) analogy of the “corpus mission”, to win new converts there may therefore be an argument for presenting DDL as “ordinary practice” (Boulton 2010c: 20). Johns (2002: 107) shows how DDL grew from his long-standing interest in “the recovery of linguistic information from authentic text”, and how it builds on many existing practices and recommendations for language learning – the use of authentic language in a learner-centred approach with emphasis on induction, noticing, consciousness raising, and so on (Boulton 2009b). None of these elements is exclusive to DDL – indeed, it is difficult to pinpoint any single feature that is necessary or sufficient to define DDL (Boulton forthcoming).

While Johns was responsible for highlighting the potentially radical nature of DDL, his own “experience in using concordance data reactively [...] indicated that it could be used proactively also in a more traditional teacher-centred setting” (1991: 31). His use of generic materials in the form of print-outs of corpus data accompanied by detailed instructions and

guidance from the teacher meant that DDL could be introduced to learners at lower levels of language proficiency and with minimal training, with immediate pay-offs. Paper-based materials of course do not have the full potential of hands-on corpus work, though it should be noted that hands-on corpus consultation does not necessarily live up to its alleged openness: the teacher may decide the points to cover, devising step-by-step tasks with set queries leading to pre-established outcomes, and monitoring performance at all stages. However, they do have a number of advantages which suggest they may be useful in some contexts at least, which is why Johns (1991: 36) even wanted to publish his in-house DDL materials on paper for a wider audience.

First, extensive training may be required to reap the full benefits of hands-on concordancing, a drain on time that can be difficult to justify in an already full syllabus (Turnbull & Burston 1998). The motivating factor of ICT is frequently overstated in education (Jarvis 2004), and the technology can be unappealing for many learners (Bernardini 2002) as well as teachers (Farr 2008). Even if suitably equipped computers are available on a regular basis, lack of technical expertise and back-up can lead to considerable waste of valuable classroom time, quite apart from time lost in changing rooms and logging on, finding passwords, struggling with the interface and query syntax, conducting inappropriate searches, misinterpreting data, and so on. Whether such difficulties are real or only presumed, they can be off-putting in many cases for learners and teachers having to come to terms with “new material (the corpora), new technology (the software), and a new approach (DDL) all at once” (Boulton 2010a: 539). In sum, the computer is one of the most significant barriers to wider uptake of DDL (e.g. Yoon & Hirvela 2004).

Use of prepared materials allows the teacher to decide the points to cover, conduct the searches in advance, select and sort small amounts of data appropriately, and present them in controlled activities tailored to the learners’ needs and abilities. The print medium can use familiar activity types (gap-fills, matching, etc.), thus presenting a more realistic goal in the short term, and may therefore be more motivating than hands-on work, as well as more appropriate for some learning styles. Paper-based materials can be more efficient as much of the background ‘noise’ is weeded out in advance, so it should be possible to use them immediately with little if any prior training. Although the teacher is still present, this is not necessarily a bad thing in all contexts, especially for novice corpus users (see Boulton 2010c for discussion). Printed materials can thus provide a convenient way in to DDL, and the scaffolding “can be gradually reduced until students can be presented with concordance output to investigate independently and unaided” (Johns et al. 2008: 495).

This is not to say that printed DDL materials are ‘better’ than hands-on corpus consultation; inevitably, they do not allow the full potential in terms of autonomy, flexibility, individualisation, life-long learning, and so on. These arguments are put forward here not to promote paper-based DDL over hands-on consultation, but to redress the balance as the former is something of a poor relation – at least as far as empirical research is concerned. In a recent survey of 80 evaluations of DDL, Boulton (2010b, web supplement) found less than a fifth using printed materials, as researchers inevitably attempt to push the boundaries as far as they can, favouring computer technology over pencil and paper.

Learners can also extract significant benefit from concordances, whether for the presentation of new items (Boulton 2008), in test situations (Stevens 1991) or for longer term recall (Boulton 2009a). When paper-based DDL is compared against a control group, Allan (2006) and Koosha and Jafarpour (2006) report statistically greater gains for DDL. Sripicharn (2003), Tian (2005) and Boulton (2010a, 2007) also give the advantage to DDL using printed materials, though the differences are not significant in these cases. Where reported, learner feedback to paper-based DDL is generally favourable in this and other research (e.g. Johns 2002; Hadley 2002; Ciesielska-Ciupek 2001). The evidence from most individual studies might seem somewhat mitigated, potentially providing ammunition to sceptics. But there are two main reasons for optimism. First, individual studies should be treated with caution: what counts is the overall picture. Inevitably, limited data sets achieve significance with difficulty (cf. the current debate on complex / dynamic systems, e.g. de Bot 2008; Larsen-Freeman & Cameron 2008), but if a meta-analysis were possible, it seems highly probable that the data would go well beyond the usual levels of acceptability (Boulton 2010b). Second, the objective is not necessarily to show that DDL is better than traditional techniques and methodologies that have received unparalleled research and practical development in classrooms around the world. Rather, it is to show that DDL can provide a complement in some cases. In other words, it is enough to show that DDL is *as good as* traditional treatment; if this is the case, then individual differences will inevitably mean that it is more appropriate for at least some learners some of the time.

The original motivation for the present study stems specifically from a pair of previous experiments with learners in the same institution, in one case using paper-based materials, in the other hands-on corpus consultation (Boulton 2010a, 2009c respectively). Feedback suggested considerable enthusiasm for the former, less for the latter, though the differences may be attributed to a number of other factors (especially a novelty effect). Such comparisons of two different studies out of context can be misleading, hence the need for a controlled experiment setting up the two paradigms in parallel, something no study has yet attempted explicitly. This paper describes an experiment where learners had experience of paper and computer-based DDL over an extended period; it looks at learning outcomes from the final activity, and relates this to the learners' appreciation of the activities, as well as proficiency levels. The main research questions are thus:

- Is there a difference in learning outcomes following DDL on paper and on computer?
- Do learners prefer DDL on paper or on computer?
- Do the outcomes or the preferences relate to general levels of language proficiency?
- How do learners' reactions to DDL change over a 10-week course?

2. Method

The underlying rationale was for two comparable groups of learners to experience DDL both on computer ('hands-on') and on paper ('hands-off') on alternate weeks for an extended period at the end of each class. In this way, all learners would be familiar with both approaches and in a position to compare them, and would cover the same language points for the final test.

Two groups of learners had 20 English classes in the year of 90 minutes each, most of which time was devoted to covering the syllabus common to all groups, and due to be tested at the end of each semester. Ten of the sessions also involved a short DDL activity for approximately 20 minutes at the end of the class, focusing on language areas the students had found difficult during an earlier in-house practice TOEIC. In the first week, the two groups completed the same activity featuring both paper-based and computer-based corpus work; subsequently they alternated between the two approaches. In this way, each group experienced both types of presentation and covered the same language points. The activities themselves were typical of those discussed in DDL research, involving induction from authentic concordances, sorting and interpreting data, testing and matching rules, and so on. The activities allowed learners to experience a range of typical DDL tasks: amongst other things, printed concordances featured matching and gap-fill exercises, while computer searches became rather freer over the course. For example, one seasonal activity asked learners to compare differences between *Christmas* and *Xmas*, find compound nouns including *Christmas* and *New Year*, and find adjectives for each. The students were then encouraged to extend their searches to other American national holidays, and discuss their findings in relation to customs in France.

Learning outcomes comparing paper-based and computer-based DDL were assessed for the final session only; here it was necessary to harmonise the activities to reduce variables and ensure comparability of the two situations. The Appendix gives the worksheet used for the final test session, and may be taken as indicative of some of the activities used throughout the course.

2.1. Population

The participants were all students in their second year of study at a French architectural college. The 108 students enrolled were assigned to five classes on a basis unrelated to their ability in English; the present data are taken from the 49 students in the two classes outlined below. Attendance is nominally compulsory but highly variable, and dependent on commitments in other courses which require projects to be submitted at frequent intervals. On average, 13 students out of 22 were present in Group A each week, 19 out of 27 in Group B. Data from 5 of the 49 students enrolled were rejected as they participated in less than 5 of the 10 sessions involving DDL. The final data set concerns 28 students for the DDL test, 38 for the first questionnaire, 36 for the second. Of the 40 who participated in at least one of these data sets, 27 were female and 13 male, the average age was 20 years, and the mother tongue French with the exception of two Arabic speakers and one Bulgarian.

English is a required course for these students, with marks each semester counting towards their degree. Following common practice in France, graduation from the school is subject to an attested level of competence in a foreign language, equivalent to B2 on the Common European Framework of Reference for Languages (Council of Europe 2001). External certification, typically from the TOEIC¹, is required for students to graduate. The participants had been studying English for an average of 7½ years, but the level of proficiency is not high:

¹ The TOEIC (Test of English for International Communication) consists of 200 multiple choice questions (100 listening, 100 reading), with brute scores converted to points out of 990 under guarded formulae which differ from test to test. See <http://www.ets.org/toEIC>.

on a start-of-year TOEIC conducted in-house, the mean scores were around 500-550 points on the TOEIC, equivalent to A2 or B1 on the CEFR. These relatively low levels of proficiency might partly be explained through lack of motivation for foreign languages, with the English classes often perceived at best as an entertaining interlude, at worst as a distraction from their main academic interests and concerns as they relate to architecture.

2.2. Corpus

All corpus data was taken from the Corpus of Contemporary American English (CoCA), currently standing at over 400 million words (see Davies 2009). This corpus was chosen partly for practical reasons, especially that it is stable, fast and reliable, available free on line with no download (students registered for a free password for the hands-on sessions), and the interface is sufficiently clear and intuitive for basic functions not to require substantial training. A further consideration is that simple, free, on-line tools and corpora allow the students to work on their own outside class if they wish, or even after the end of the course, and can be used immediately by other teachers – essential if DDL is to reach out to a wider audience. It is not possible here to give a full run-down of all the features offered on the BYU site,² but various activities required the students to use wild cards and part-of-speech tags, to look at frequencies and word lists, to create collocates lists and interpret random samples of concordances, to search by register, use the ‘chart’ function, and compare usage in various ways.

2.3. Data collection and test instruments

The data were collected from: a) a test on the target language items of the final session to compare learning outcomes from paper-based and computer-based DDL activities; b) a questionnaire completed after the first and final sessions to gain feedback on learners’ reactions to DDL.

2.3.1. Test of learning outcomes

The language point in the final session concerned four verbs largely associated with two distinct types of verb structure: ‘infinitive’ and ‘subjunctive’ (Biber et al. 1999: §9.4, §3.9 respectively), and can be summarised traditionally as:

- infinitive: *encourage someone to do something*
advise someone to do something
- subjunctive: *recommend someone do something*
demand someone do something

These verbs and structures were chosen not for their communicative importance, but because they are frequently tested in the TOEIC, and correspond to questions which had presented difficulty for these students in the start-of-year TOEIC practice. Although these were the main target structures, other types of structure associated with the verbs were not neglected, as can be seen in the worksheet provided in the Appendix. Table 1 outlines the

² The reader is referred to the ‘more information’ documents on the CoCA website: <http://www.americancorpus.org/>.

basic lesson plan for the final session, showing how each group used both techniques and covered all four verbs.

Table 1. Final lesson plan

	introduction	phase 1	phase 2	reflection	feedback
		paper-based DDL	computer-based DDL		
Gp A	introductory examples	<i>encourage</i> <i>demand</i>	<i>advise</i> <i>recommend</i>	pair the verbs according to typical patterns	whole-class, student- initiated
Gp B		<i>advise</i> <i>recommend</i>	<i>encourage</i> <i>demand</i>		

The materials themselves were devised to be representative of much current DDL practice, albeit in a fairly controlled fashion – a ‘soft’ version, to borrow Gabrielatos’ (2005) term. Following a short introduction and an example using a different verb, students worked in pairs, using printed concordances to find the patterns associated with the first two verbs, then working on-line for the second two, and finally comparing the two verbs they had in each phase to detect similarities and differences. The teacher monitored work in progress, directing students’ attention where relevant and, in the hands-on phase, occasionally making suggestions to help with technical or search difficulties. Once the students had completed the tasks, whole-group feedback was instigated to ensure that all students came away with essentially the same information – the key point being that they had worked it out for themselves. The procedure was thus essentially the same for the data on paper and on computer, and each group did both types of activity for both main types of verb structure. In each case, the paper-based work was done first for practical reasons, which if anything should have given the advantage to the computer-based work as students would already have become familiar with the procedure and solved some problems in the previous phase.

The test instrument was presented as TOIEC practice to be completed at the end of the learning period, and lasted about 15 minutes (see Figure 1 for examples). It consisted of 20 questions based on clear contexts taken from elsewhere in the corpus (i.e. authentic contexts similar to those worked on, though here featuring only full sentences). There were five forced-choice questions for each verb covered, in standard single-sentence gap-fill format. This has the advantage of being familiar to students through years of practice (the exact format was based on the TOEIC Part 5 – incomplete sentences), and ensured only one ‘correct’ response per item to produce quantifiable data. The results can thus be sorted according to treatment, to verb type, and to group.

Figure 1. Examples of test items

1. The U.N. Security Council has _____ all enrichment activity because of suspicions the program's aim is to make weapons. (A) demanded that Iran stops (B) demanded that Iran to stop (C) demanded that Iran stop (D) demanded Iran to stop	2. Mubarak also used his visit yesterday to _____ out of Iraq. (A) encourage the United States get (B) encourage the United States to get (C) encourage that the United States get (D) encourage that the United States to get
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2.3.2. Feedback questionnaires

In addition to the test for learning outcomes, a questionnaire was completed after the first and the last DDL sessions to obtain feedback from the learners. The questionnaires were short and simple in the learners' mother tongue, requiring responses on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), with the opportunity to provide extra information where they desired, although this opportunity was rarely taken up. The two questionnaires were essentially identical, with minimal changes in form. The first five questions sought to measure the learners general 'receptivity' to DDL as a whole; further questions looked at their perceptions of potential applications of corpora and how they might be used. In addition, the second questionnaire also sought to compare the students' reactions to the use of paper- and computer-based DDL.

3. Results and discussion

3.1. Tests

It is important to remember that the objective here is not to show that DDL 'works' (as there is no pre-test and no control group), but merely to compare paper- and computer-based use of corpus data. Table 2 gives the mean scores for each group on the test of learning outcomes from DDL: 10 paper-based and 10 corpus-based items; 10 'infinitive' and 10 'subjunctive' structures.

Table 2. Learning outcomes

	Group A (n=11)	Group B (n=17)	ALL (n=28)
paper treatment	5.73	5.29	5.46
computer treatment	5.55	5.18	5.32
infinitive structures	7.27	6.24	6.64
subjunctive structures	4.00	4.24	4.14
MEAN	11.27	10.47	10.79

Although there is no a priori reason to expect one group to perform better than the other (as both experienced both types of treatment), Group A does score higher than Group B, but the result is not significant ($p > .05$); see Table 3. There was a statistically significant difference between the two types of structures, with the infinitive structures being used more correctly than the subjunctive structures ($p < .0001$).

Table 3. Comparative analysis of different data types

	paper vs. computer ^a		infinitive vs. subjunctive ^b		group A vs. group B ^c	
	Gp A	Gp B	Gp A	Gp B	Gp A	Gp B
Mean	2.73	2.66	3.32	2.07	2.82	2.62
SD	1.41	1.64	1.32	1.46	1.5	1.55
N	56	56	56	56	44	68

a) two-tailed paired *t*-test: $p=.7421$ ($t=.33$; $df=55$; $SE=.22$)

b) two-tailed paired *t*-test: $p<.0001$ ($t=5.7$; $df=55$; $SE=.22$)

c) two-tailed unpaired *t*-test: $p=.4988$ ($t=.68$; $df=110$; $SE=.30$)

The crucial comparison is between paper-based and computer-based treatments: here the former resulted in slightly better results for both groups, but the difference is not significant ($p>.05$). These results support the original hypothesis that using prepared corpus data in printed materials can be as effective as hands-on concordancing, at least for short-term learning outcomes with students such as these – i.e. with comparatively low levels of proficiency and motivation following several short sessions of corpus work, both on paper and on computer.

It is possible that the lack of difference between the paper-based and computer-based treatments might be in part a factor of the experiment design itself. For the two presentations to be comparable, it was necessary to reduce the potential variables involved, which in turn reduces the likelihood of finding a significant difference. This is not a new dilemma, as reported for example in the work by Sripicharn (2003) in another DDL experiment. Thus both paper-based and computer-based presentations involved essentially the same instructions and procedures, the main difference being that work on computer also required the students to formulate the queries themselves, to sort the results and analyse more data than for the paper-based activity. The learners therefore have more to do in this case, which may reduce their chances of success in the short-term.

On the other hand, they also have more opportunity to adapt the task as they see fit, appropriating it for their own ends: they can by-pass obvious things to focus on language that is unclear to them, adapt the queries appropriately, refine and extend them as necessary, select data which are relevant to them, and see more contexts than were available in the printed concordances. All of these things are more typical of hands-on concordancing, and although the learners had become used to conducting such procedures themselves over the course, this was not enough to give them the advantage. The difference between hands-on and hands-off corpus work is about more than merely the medium of delivery. Only computer-based work can make the most of long-term benefits such as noticing, language awareness and autonomy. If the results reported here are any indication, a 10-week period is not sufficient for such advantages to accrue, and support the use of paper-based materials in the short term.

3.2. DDL questionnaires

Though 36 and 38 students responded to the two DDL questionnaires, only 32 completed both due to the inevitable absences. The data in Table 4 show that the students as a body consistently responded favourably (i.e. attributing a score of at least 3 out of 5) to all items in both questionnaires. Inevitably the average tendencies conceal a certain amount of variation. This is particularly relevant among the first five questions (whether corpora are easy, useful and interesting to use, and whether the respondents felt they learned something and would like to do more such activities in class), which may be taken as some indication of the students' general 'receptivity' to DDL. For these questions, five students were responsible for the eight lowest scores of 1 out of 5 in the second questionnaire, while 14 of them gave the highest score of 5 out of 5 at least once. This suggests that there are some strong opinions, though most responses are of course more neutral, as indicated by the relatively low standard deviations. To borrow Kaszubski's (2008: 174) terminology, there are some "adopters" and some "refusers" but most rate the various functions in the middle, somewhere above the mean possible score. Moreover, the adopters in the first questionnaire tended to remain positive in the second, and vice versa, as Pearson's correlation coefficient for each student's average receptivity between the two questionnaires is very high ($R=.61$).

Table 4. Questionnaire responses

		Q'aire 1		Q'aire 2	
		mean	SD	mean	SD
<i>A. General receptivity to corpus use</i>					
1.	I think corpora [will be / are] easy to use.	3.55	1.03	3.69	1.04
2.	I think corpora [will be / are] useful.	3.87	0.70	3.50	0.85
3.	I think corpus work [will be / is] interesting.	3.87	0.88	3.36	0.87
4.	I think I [will learn / learned] things from corpora.	3.89	0.73	3.69	0.86
5.	I would like to do other corpus activities in class.	3.66	0.94	3.06	0.98
MEAN:		3.77	0.86	3.46	0.94
<i>B. Using corpora</i>					
6a.	I liked doing corpus activities on computer.			3.28	1.06
6b.	I liked doing corpus activities on paper.			3.08	0.91

Overall, however, the average scores for general receptivity to DDL decreased (from 3.77 to 3.46), suggesting a drop over the course; moreover, this decrease is statistically significant ($p<.0001$, see Table 5). Yet this is perhaps not unduly worrying. First, though significant, the decrease is relatively small ($-.31$). Secondly, it is perhaps to be expected, as the first questionnaires likely reflected a certain 'novelty effect' which would inevitably diminish over time. Given learners whose main motivation is not English, anything new may seem desirable; after a period of time, the new activities are no longer new, and are thus by definition less desirable – clearly this is not specific to DDL. However, it could also reflect a more realistic appreciation of what corpora can bring to the learning process, or a general perception that the work is particularly mechanical or laborious, as other researchers have found (e.g. Chambers 2005) – especially in the present context where these non-specialist learners expect to be entertained during their English courses.

Table 5. Changing attitudes to corpus use (questions 1-5)

	Q'aire 1	Q'aire 2
Mean	3.78	3.45
SD	0.62	0.56
SEM	0.11	0.10
N	32	32

two-tailed *t*-test: $p=.0008$ ($t=3.73$; $df=31$)

The final pair of items, possible in the second questionnaire only, asked students for their opinions on the crucial issue of using computer-based and paper-based materials. As the results show, these students do have a preference for working on computer (3.28 vs. 3.08), though the scores are not high (interestingly, their 'liking' for each type of activity is lower than their overall 'interest', gauged at 3.36 in question 3 of this questionnaire), and the difference not statistically significant ($p=.36$). The question did not explicitly ask students to say if they preferred one to the other, and they could equally like (or dislike) both. However, the correlation coefficient is not particularly high ($R=.18$) and not statistically significant ($p=.28$), suggesting that their feelings towards the two styles of presentation are independent: some prefer working on paper, others on computer.

3.3. Relating the data

Both test results and representations are interesting in their own right, but it might also be revealing to relate them to each other. Table 6 shows the correlation between the students' general receptivity to DDL (as measured by their average responses to questions 1 - 5 in the second questionnaire), and the outcomes of the DDL test (following the computer and paper-based presentations, and the two combined). The correlations do suggest that, overall, the more receptive a student is to DDL, the more likely he or she is to perform well, but the results are not statistically significant.

Table 6. Learning outcomes and general receptivity

		receptivity to DDL
outcomes	computer	0.20
	paper	0.26
	ALL	0.27

It is also possible to compare preferences and outcomes for using corpora on paper or on computer, but here Table 7 shows negative correlations all round. The more they like doing one type of DDL activity (on computer or on paper), the less well they actually do on the other. This seems to make sense, except that one would also expect them to do better on paper if they prefer paper, and vice versa, an expectation that is not borne out by the data. The more they like doing paper-based DDL activities in particular (where the correlation reaches significance), the lower their learning outcomes.

Table 7. Learning outcomes and learning preferences

		preferences	
		paper	computer
outcomes	computer	-0.27	-0.24
	paper	-0.51 ^a	-0.36

a: two-tailed *t*-test: $p=0.0216$ ($t=2.5$; $df=18$)

Finally, the data presented in Table 8 relate the learning outcomes (for paper- and computer-based treatments, as well as overall) to three possible measures of the learners' level of proficiency in English: a) their scores in the start-of-year TOEIC; b) their marks in the end-of-year exam based on the syllabus common to the entire cohort; c) the number of years of study (data available for 26 students in all cases). It should be remembered that the population as a whole is of roughly lower-intermediate level, ranging from 'elementary' to 'intermediate' only.

The only significant results are for the paper-based treatment, which correlate positively with two of the three indicators of proficiency. One way of looking at this is that the more advanced students have achieved their higher level of proficiency from their previous experience of language teaching, which tends to be fairly close to the traditional knowledge transmission model in France (cf. Brown 2007). It might then seem that paper-based DDL corresponds more closely to this, and offers a way in to DDL which does not represent an unsettling break with the past. On the other hand, there is no significant correlation between proficiency and the computer-based activities, nor with learning outcomes taken as a whole. This suggests that DDL as an approach can be useful to learners at different levels of proficiency within the band represented here, and that a hands-on approach in particular may open it up to lower-level learners. This result may contradict received wisdom whereby only advanced learners can be entrusted with hands-on corpus work (e.g. Granath 2009), but is in line with Yoon and Hirvela (2004), who also found their intermediate group more favourably disposed to DDL than the advanced group.

Table 8. Learning outcomes and proficiency

		TOEIC	proficiency	
			EOY	years
outcomes	computer	-0.01	-0.09	0.02
	paper	0.55 ^a	0.37 ^b	0.19
	combined	-0.32	-0.16	0.13

a: two-tailed *t*-test: $p=0.0024$ ($t=3.36$; $df=26$)

b: two-tailed *t*-test: $p=0.0263$ ($t=2.03$; $df=26$)

4. Conclusion

Feedback from the learners suggests the majority are generally favourable to the DDL approach as a whole, with a sizeable minority very receptive, and only a small number overtly unconvinced. Such a distribution seems inevitable: few activities or approaches are likely to appeal to all learners, and appeasing the refusers would mean rejecting virtually any novel practice. Receptivity to DDL also dropped slightly over the duration of the course, but not significantly. Again this is to be expected for any new practice given the present context

where the learners are not particularly motivated to L2 work as a whole, and any novelty appeal will diminish over time.

The main objective was to see how a DDL approach using paper-based materials can fare when compared to hands-on concordancing. The results show a slight advantage for printed materials in terms of learning outcomes, though the difference is not significant. The implication is that printed materials do have a role to play, especially in producing immediate results with learners at lower levels of proficiency and with limited time available for training. Further, highly controlled activities on paper also provide a gentle lead-in to more open-ended individual work (cf. Gabrielatos 2005), a claim which is supported by the present study. First, the learners' level of language ability was found to be positively correlated with outcomes from the paper-based treatment; this suggests that these materials are more familiar and compatible with their prior learning experiences, and useful as a first step. On the other hand, there was no correlation between language proficiency and hands-on concordancing, which leaves open the possibility that computer-based corpus consultation may be accessible to all at a later stage. Additionally, the learners had a slight preference for computer-based work overall, which is encouraging in this respect.

The claim is not that paper-based DDL is 'better' than working directly on an electronic corpus, especially in the long term. The most important conclusion is that prepared, controlled DDL activities should not automatically be ruled out: they represent one option which may be applied in different ways according to local conditions. Various factors need to be taken into account – practical and logistical (e.g. the accessibility and reliability of computer rooms and support staff), cultural and individual (especially in terms of learning styles and expectations from past experience), as well as pedagogical. Both hands-on and paper-based DDL have their own advantages and limitations; each may be more appropriate for some learners, teachers or contexts than the other.

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Appendix

Final DDL activity: paper and computer-based worksheets for verb structures

NB This worksheet is for Group A only; Group B had essentially the same worksheet and tasks but alternated the treatment for each pair of items.

CORPORA 10 – VERB STRUCTURES

Verbs occur in different structures in French, e.g.:

- *demander à quelqu'un de faire quelque chose*
- *vouloir que quelqu'un fasse quelque chose*

Similar patterns exist for English too, and are a favourite in the TOEIC, with questions like:

I stopped _____ the report about the supply problem to the Korean office.

- (A) David from send
- (B) David sends
- (C) David from sending
- (D) David to send

The concordances below should help you find the best answer:

-
- a. was no stopping it. No matter -- nothing could have **stopped** me from doing what I did -- not prayer, not my will, not
b. vice president have not ruled out using military force to **stop** Iran from getting a nuclear weapon. In fact, Iran might heed Israel's
c. on his armor-toed boot, and he caught her by the hand to **stop** her falling. She thought once more of the golden retriever pup, who had
d. . " In some places, " Ms. Raje said, " women were **stopped** from going to the film. " # Ms. Raje laments the rigidity of popular
e. # The day Topsy died was a cold, cold day, which didn't **stop** the people from coming out to watch. Electricity was a novelty, and movies
-

The main patterns of usage here are:

- *to stop someone (from) doing something*
- *to be stopped from doing something*

A. USE THE PRINTED CONCORDANCES BELOW

Examine the 5 concordance lines below for each verb, and note patterns of usage in the boxes.

encourage:

demand:

-
1. create a seasonal garbage dump for bears? This would **encourage** the bears to stay in their own territory, fulfill their needs there and quit
2. their own and each others' learning. Students are **encouraged** to direct themselves through lessons in learning through discovery.
3. can absorb more high-skill immigrants. I think we should **encourage** them to come here and stay here permanently. And the solutions, really,
4. cause Amtrak to increase the number of trains, and would **encourage** the development of faster trains. # Go, Amtrak -- the airlines need the
5. reforms Early in the crisis, EU finance ministers **encouraged** the European Commission and national regulators to agree on stricter
-

6. of ordering the death of a popular opposition leader. They **demand**ed he resign within 24 hours. Nano's whereabouts were unknown, but his
7. of that crime, Kissinger went to federal district court to **demand** his client be taken off death row. But by this time, he had
8. would be well-advised to lead by example and **demand** his subordinates do the same. # Candor-facts - Just the facts: # Every
9. And coming up protesters joined forces this weekend and **demand**ed that CBS fire David Letterman for his jokes about the Palin family. The
10. were to present evidence to the second in command and **demand** that he take over, how would we know that the second in command is
-

B. USE THE ON-LINE CORPUS

Find concordances for the following verbs, and note frequent patterns of usage in the boxes.

advise:

recommend:

- Each verb in A has similar patterns to one verb in B – which corresponds to which?