The Open University

Tutor perspectives on the use of visuals in undergraduate assignments

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Aim

- Investigate the writing of L1 Chinese and L1 English students in three disciplines (Biological Sciences, Economics and Engineering).

Outline

1. Establish that there are differences in use of visuals
2. Investigate tutors' views on this
3. Explore EAP tutors' views

Background: Framing in academic literacies

Deficit approach

- student writing is ‘remedial’, ‘immature’ and contains ‘problems’ or ‘errors’ - especially L2 English student writing

  (Chen and Baker, 2010; Paquot, 2010)

Vs.

Academic literacies approach

- writing within the academy is a set of social practices in which genre, context and culture are highly significant
- highlights ‘the variety and specificity of institutional practices, and students’ struggles to make sense of these’ (Lea and Street, 2006: 376).
- *All* student writers are in a constant struggle to establish the preferred ways of making meaning within their particular context (e.g. Lillis, 2006).

The data

The corpora

- British Academic Written English (BAWE) & beyond
- All proficient writing

- 58 texts from L1 Chinese students (107,000 words)
- 202 texts from L1 English students (429,000 words)

ESRC project number
RES-000-23-0800

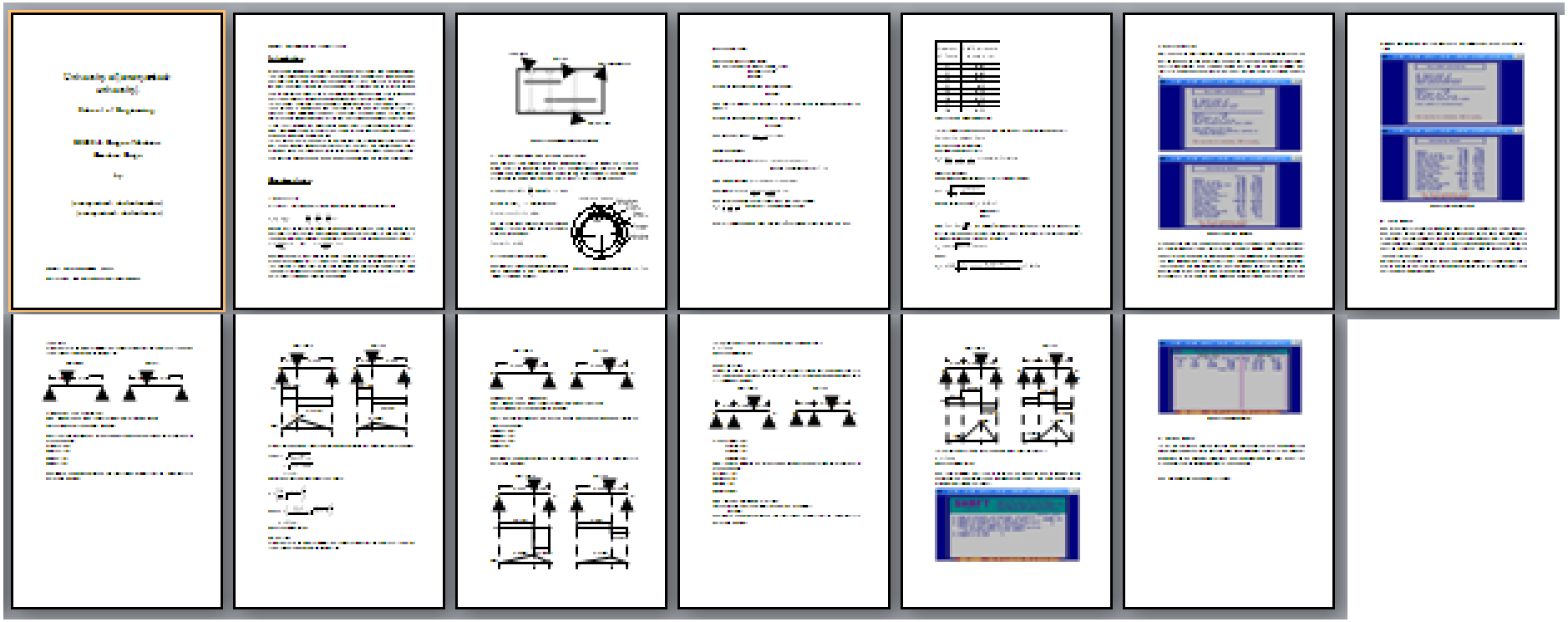
Interviews & questionnaires

- Interviews with 18 lecturers in Biological Sciences, Economics and Engineering in 6 UK universities

- Questionnaire responses from 200+ teachers of EAP (English for Academic Purposes)

- Interviews with students - ongoing

A year 3 Engineering assignment



Visuals and extended captions in Biology

The role of maternal effect genes in the development of the nematode *Caenorhabditis elegans*

ABSTRACT

Caenorhabditis elegans (*C. elegans*) has been used as one of the favourite model organisms for developmental studies. Embryogenesis of *C. elegans* extensively relies on maternal effect genes for intrinsically asymmetric cell division and cell-cell interactions. In this review, the early embryogenesis of *C. elegans*, from the establishment of Anterior-Posterior polarity initiated by sperm entry to the asymmetrical cell divisions and different cell lineages induced by a variety of cell fate determinant is summarized, some of the molecular mechanisms carried out by the crucial maternally expressed cell fate determinants underling these processes are described.

INTRODUCTION

The *C. elegans* and its life cycle

Caenorhabditis elegans (*C. elegans*) is a small (~1mm long) free living soil nematode that has a predominantly hermaphroditic adult life. (Figure 1)

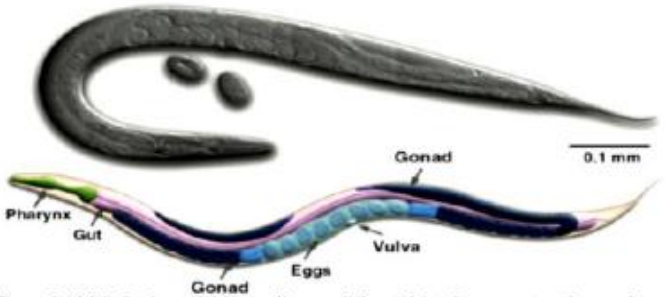


Figure 1 Adult *C. elegans* [1] Upper diagram: differential interference contrast image of an adult *C. elegans*. Lower diagram: anatomical structures of adult *C. elegans* (schematic drawing). Middle Left scale bar: 0.1 mm

The life cycle of *C. elegans* contains an embryonic stage, four larval stages (L1-L4) and an adult stage. (Figure 2) Molt (apolysis, new cuticle formation, and ecdysis) takes place at the end of each larval stage. Under certain external conditions such as starvation, a non-growing stage, dauer larva, may form through a facultative, reversible, arrest at the lethargus in the second of four cuticle molts. The life cycle is about 2 to 3 weeks. Each

L1 Chinese writer

{anonymised: student name}, {anonymised: student number}

The role of maternal effect genes in the development of the nematode *Caenorhabditis elegans*

Maternally expressed genes are essential for the correct patterning and cell-fate determination in the early *Caenorhabditis elegans* embryo. The PAR proteins and MEX-5/6 are responsible for initial polarisation of the zygote, *skn-1* is required to specify the EMS fate, the bifunctional protein PIE-1 is required to maintain the totipotent germ cell lineage and specification of the AB lineage involves a system homologous to Notch in *Drosophila*. This review describes the current understanding of these molecular mechanisms in the specification of cell fates in the pregastrulation embryo.

Introduction

The potential of *Caenorhabditis elegans* as a model organism for the study of embryology emerged in the 1970s (Brenner, 1974). This free-living soil nematode is ideal for studying in the laboratory as it has a rapid period of embryogenesis (16 hours) and each worm has an invariant cell lineage, with exactly 959 somatic cells in the adult, which can be easily traced during development through the transparent cuticle (Sulston & Horvitz, 1977). *C.elegans* is a small round-worm, approximately 1 mm long, that lives for 2-3 weeks and can be fed on *Escherichia coli*, which allows large numbers to be conveniently raised in a Petri dish. The predominant adult form is hermaphroditic, containing both sperm and eggs and therefore reproduction is rapid, either by self-fertilization or by cross-fertilization with the rare males.

The genetics for *C.elegans* is advancing rapidly. It has a small genome at 8×10^7 bp and relatively few genes for a eukaryote – around 17,500. It was the first multicellular organism for which the genome was completely sequenced (*C.elegans* Sequencing Consortium 1999) and approximately 8,000 *C.elegans* proteins have already been matched to homologous human gene transcripts (Lai *et al.*, 2000). Specific mutants may be produced by targeted deletion through transposon insertion or mutagens. Embryos may be manipulated by transformation or injection with transgenes and marker proteins such as green fluorescent protein (GFP) are easily visualised in the transparent embryos. RNA interference (RNAi) is a particularly useful technique for studying maternal effect genes by eliminating the expression of specific maternal or zygotic genes in offspring.

Reproduction

In hermaphrodite worms, fertilization occurs in the spermatheca – an organ where the sperm is stored – when mature oocytes pass from the ovary towards the vulva (Fig 1A-B). The point of sperm entry determines the posterior end of the embryo. After fertilization, a rigid, ovoid-shaped chitin eggshell called the chorion is made (Kemphues & Strome, 1997) and the long axis of this ovoid is termed the anteroposterior (a/p) axis of the embryo.

L1 English writer

Bulleted lists vs. connected prose in Economics

EC 226 ECONOMETRICS I Assignment I {anonymised: student number}

Year 2002 vs. Year 2003 vs. Year 2004: The average mark for 2002, 2003 and 2004 students are 63.96, 61.70 and 69.19 respectively. Students in 2004 did better than Year 2002 and 2003. **These qualitative variables would have some impacts on the QTMARK, but whether they are statistically significant will be investigated later.**

Correlation matrices[2]

- It is found that QTMARK has strong POSITIVE relationships with variables ABILITY, ALEVELSA, ATTC, ATTL and strong **NEGATIVE** relationships with variables EXPALC and TOPB.
- The correlations between ATTC, ATTL and ATTR are very high. Therefore, **multi-collinearity** is an issue needed to think about later on.
- EXPALC has strong **negative** relationships with ATTC, ATTR and ATTL and strong **positive** relationships with TOPB. It could be explained that students who got drunk cannot get up easily to attend the lectures and classes. The more TOPB they attended, the more money they spent on alcohol.
- Generally, HRSQT has strong **positive** relationship with ALEVELS and ALEVELSA, while strong **negative** relationship with ABILITY and TOPB. This could be explained that the more TopB students went for, the fewer hours they spent on studying and the higher ability a student has the less hour of study is required for him/her. On the other hand, students having a good A-level record maintained their hard working attitude.

2. ***Bivariate Regression and Multivariate Regression***

(a) Bivariate Regression

$$QTMARK=\alpha^1+\beta^1 ATTR+u^1$$

The following results are obtained after running the bivariate regressions in EViews[3]

$$QTMARK = 64.97023 - 0.002217ATTR$$

Interpretation for the regression results:

- The intercept 64.97 means that even students did not attend any revision lecture, they could get 64.97 in the exam, which may not make much economic sense as revision lectures are designed to boost a student's exam marks.
- Slope coefficient of -0.0022 shows an inverse relationship between the attendance of revision lecture and exams performance. It means that 1% increase in the proportion of revision lecture attendance would decrease students' mark by 0.0022 in the exam. Economic interpretation of this could be that students who attended revision lectures would spend more time revising topics mentioned in the revision lecture and ignoring other topics. However as the coefficient is small, we could nearly omit its effect.
- **R-squared** value of about 0.000047 means that only 0.0047% of the variation in QTMARK is explained by ATTR. Therefore it could be concluded that ATTR has such a trivial effect on exam performance that **it could even be omitted.**

Two-tailed t-test for the significance of the slope β^1

H0: $\beta^1 = 0$ (Proportion of revision lecture attended does not affect exam performance)

H1: $\beta^1 \neq 0$ (Proportion of revision lecture attended does affect exam performance)

Since the calculated t-value -0.13 is lower than the critical value of t-test at 5% significance level with 370 d.o.f, we fail to reject H0 in this case and the conclusion is that **revision lecture attendance does not affect exam performance.**

(b) Multivariate Regression

$$QTMARK= \alpha + \beta_1 ATTR + \beta_2 ABILITY + \beta_3 HRSQT + u$$

Modelling by OLS[4], we get:

$$QTMARK= 36.82527 + 0.105949ATTR + 0.849900ABILITY + 0.417658HRSQT$$

Interpretation of the regression results:

[2] Refer to "Correlation matrices for those quantitative variables" in the Appendix.
[3] Refer to the Appendix for the Bivariate regression results tables.
[4] Refer to the Appendix to find out the Multivariate regression results table.

L1 Chinese writer

EC226 Econometrics 1
Assignment 1 2004-5

Question 2b

Interpretation of results (equations 4 and 5 appendix 2)

The coefficient on class attendance is 0.15, which implies that holding all other variables constant, if you increase class attendance by 1 unit (1% increase in class attendance in a year), then the exam mark will increase by 0.15 units (0.15% increase in your mark). The coefficient on lecture attendance is 0.06, meaning holding all other variables constant, attending 1% more lectures will increase your mark by 0.06%. The coefficient on revision lecture attendance is slightly surprising, at -0.04, implying that by attending 1% more revision lectures, your mark will *decrease* by 0.04%. The intercept can be interpreted to mean that if you attended no classes, revision or standard lectures, you would score 49.33%

Tests (shown in appendix 2)

The coefficient on class attendance was significant at the 0.01% level implying that in the multiple regression models, class attendance has a significant impact on test mark. The coefficient on lecture attendance however was not significant, even at the 10% level, implying perhaps that lecture attendance does not have a significant impact in a multivariate framework. However, lecture attendance does appear to have a reasonably high correlation with class attendance[3], so the regression may be suffering from multicollinearity, which has made the result not significant. However, multicollinearity must be occurring with another factor being 'unhelpful' for it to have a negative impact on the regression. The coefficient on revision lecture attendance was significant up to the 1% level, thus implying that while we can be fairly sure that revision lectures have a significantly negative impact, there is scope for the fact that the null hypothesis is indeed correct (type I error) and that the result is not significant.

The F-test for the joint explanatory power of the independent variables yielded an F-statistic of 13.07. This is significant at the 0.01% level as it exceeds the critical value of 3.78. Hence we can reject the null hypothesis given in the appendix. This means that the explanatory variables have made a significant joint contribution to exam performance.

Question 3

To investigate whether there are differences in performance between the sub-sample of 2002 students and previous year's students I have created intercept dummy variables and added them to the original equation, as shown by equations 1 and 2 in appendix 3. The first equation is known as the restricted equation, as opposed to the unrestricted model in equation 2, because it imposes the F-test null hypothesis (see hypothesis 4, appendix 3) on equation 2. Hence in equation 2, the intercept is allowed to vary whereas it is not allowed to equation 1 and is assumed to be constant in all years.

Interpretation of coefficients

The intercept in equation 3 can be interpreted as before, meaning that if you attended no lectures and had no A's at A level you would score 56.97. This is slightly nonsensical in the sense that you would not have got onto the course if you did not score any A's at A level. The coefficient of 0.14 on lecture attendance means that if you attended 1% more lectures you would get 0.14 out of 100 more in the exam ceteris peribus. The coefficient of 0.04 on A's scored at A level means that if you get an extra A at A-level you would get 0.04% more ceteris peribus. The dummy variables in this case have a slightly different interpretation. Basically they say how much the intercept will move up or down compared to the omitted category, the year 2000 students. The dummy variable coefficient on 1999 of -1.19 means that if you are a 1999 student, you will score a proportion of 1.19% less than if you are 2002 student. The coefficient of -5.19 on the 2000 dummy variable means that you will score a proportion of 5.19% less than if you were a 2002 student. Finally the coefficient of -6.85 on the 2001 dummy variable means that you will score a proportion of 6.85% less than if you were a 2002 student. These are shown in equations 3 to 6.

[3] As reported in question 1, the correlation coefficient was 0.67.

L1 English writer

Methods

1. Extraction of corpus linguistic keywords and counts of visuals
2. Thematic analysis of lecturer interviews
3. Quantitative and qualitative analysis of questionnaire responses

Keywords relating to visuals and lists

L1& discipline	Chi-Biol	Chi-Econ	Chi-Engin
Selected keywords	*#*	*growth*	*#*
	table	*curve*	*eq.*
	data	*refer*	*according*
	equation	*model*	*figure*
	figure	*per*	
	graph	*output*	

A word which is *positively* key occurs *more* often than would be expected by chance in comparison with the reference corpus.

Keywords relating to visuals and lists

Biology

- All "Phases" are labeled on the graph. The curve of the Exponential Phase was straight, though some point lay outside this best straight line of fit (0041a).

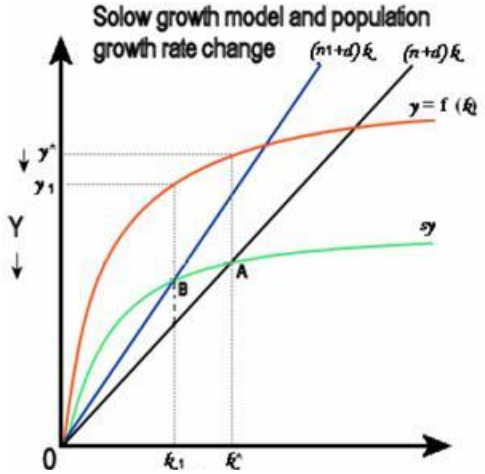
Economics

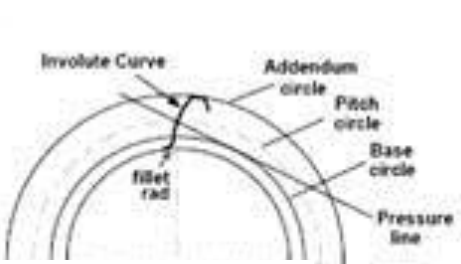
- Actually the total loss resulting from the lower monopoly output (Q M) is the grey triangle. The part of the grey triangle above P C is the loss of consumer surplus (6008q).

Engineering

- According to the program and refer to the figure 4.1.1, it is easy to find… (6107d).

Visuals





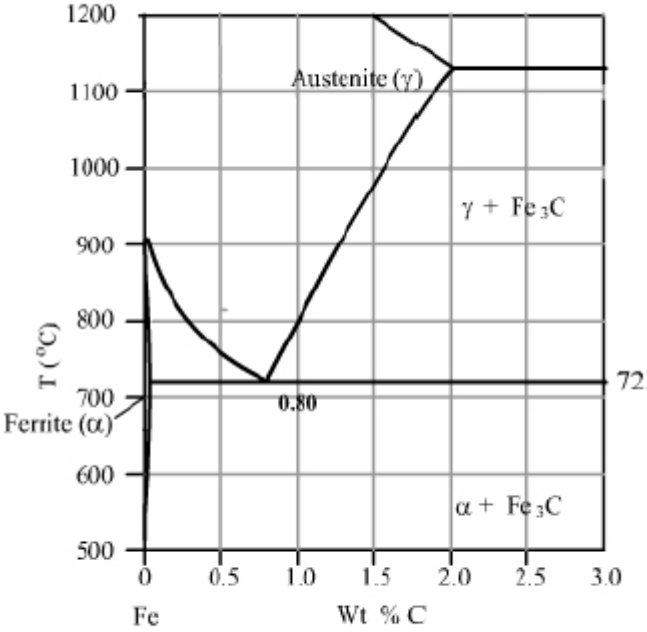


Figure.1

Photograph 9 – Tree shrew pollinating the male flower

[Attenborough, 1995]

Carbon Content %	Classification	
0.3-0.4	Low Carbon Steel	General for weld
0.3-0.7	Medium Carbon Steel	Used fo nuts, sha dif
0.7-1.7	High Carbon Steel	Use applicati and

Table.1

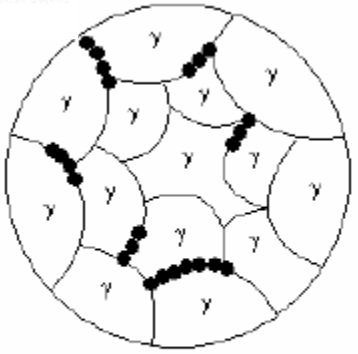


Figure 7

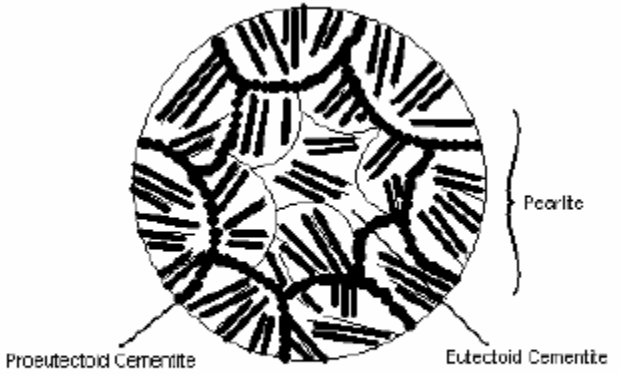


Figure 8

Lists and ‘listlikes’

- Sales promotion:
  - Monthly promotions, according to customer sales and current interest
  - Discounts for bulk orders
  - Free P&P on orders over £25, encouraging bulk buying
  - Discounts for new businesses using us for the first time, on condition they use us for a mini of two more orders
- Public relations:
  - User friendly website
  - Easy search tools within website, enabling you to find the exact bulb you want even for the engineering minded
  - Extensive "Help" and "FAQ" pages
  - 12hour guaranteed reply to email queries

Conclusions

The experiment yielded the following conclusions:

- The efficiency of a single stage centrifugal pump at high pump speed (3000 RPM) is better than it at low pump speed (2000 RPM).
- The input power with high pump speed increases faster than the one with low pump speed as discharge increases.
- The relationship between total head and discharge is not affected by pump speed, but higher pump speed provides higher total head.

Counts of visual and list items

	Tables	Figures	Lists	Listlikes
Chi-Biology	15****	25****	1	4
Eng-Biology	5	13	2	6
Chi-Economics	1	14****	2*	25****
Eng-Economics	0	12	1	3
Chi-Engineering	10*	21	7	53****
Eng-Engineering	7	21	10	24

per 10,000 words

* p<.05
** p<.01
**** p<.0001

Summary… and some questions

Summary

- L1 Chinese students make significantly greater use of visuals and lists than L1 English students
- All BAWE assignments have been judged proficient
- = > suggests these are different, yet equally valued, ways of writing

Questions

- Are visuals and lists used as *strategies* to meet the challenge of producing extended pieces of writing in unfamiliar genres in L2?
- Perhaps some students are more visually-oriented?
- What do discipline tutors think of this greater use of visuals and lists?
- Do EAP tutors teach students how to use visuals and lists as strategies?

Interviews with lecturers 1

Importance of visuals

- Diagrams and formulae are ‘the spine of the essay’ (Economics)
- The ‘challenge’ is ‘to marry the diagrams with the text’ (Economics)
- Including visuals helps students gain better marks as it avoids having to describe and introducing errors (Biology)
- Marks for presentation may include the assessment of diagrams, tables and overall layout (Engineering).

Being concise

- Preference for ‘precision, incision, concision’ (Economics)
- ‘there’s never been a penalty for an essay that’s too short’ (Biology)
- Good writing is ‘clear’, ‘concise’; and dislike ‘verbosity’ (Engineering)
- British ss ‘use too many words’ - ‘don’t use 10 when you can use 5’.
- Proforma may say ‘include a table here’. May be given font sizes, margin size, line spacing, ‘so people can’t cram in words’.

Interviews with lecturers 2

Bulleted lists are ok

- …but the words have to be ‘particularly good’
- ‘easier to mark if bullet points’
- in exams, bullets are ‘ideal’ not paras. ‘no need to dress it up as an essay’. Be straightforward. (Engineering)
- ‘Gives visual emphasis’.
- ‘essay questions allow you to hide the things you don’t know.’ (Economics)

‘Maths-oriented’ and ‘journalistic’ students in Engineering and Economics

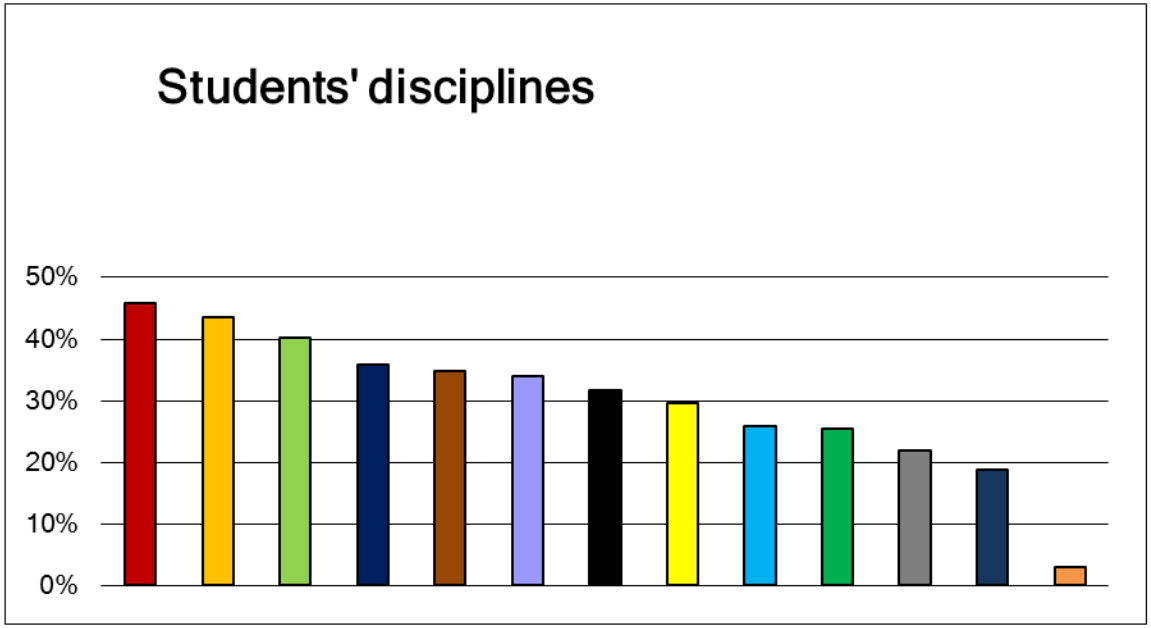
- 2 types of student – ‘maths-inclined student who would be happy putting bullet points instead of prose’ and students who are good at writing prose but ‘not as strong mathematically’.
- students see essays as a ‘refuge from problem-solving questions’ (Economics)

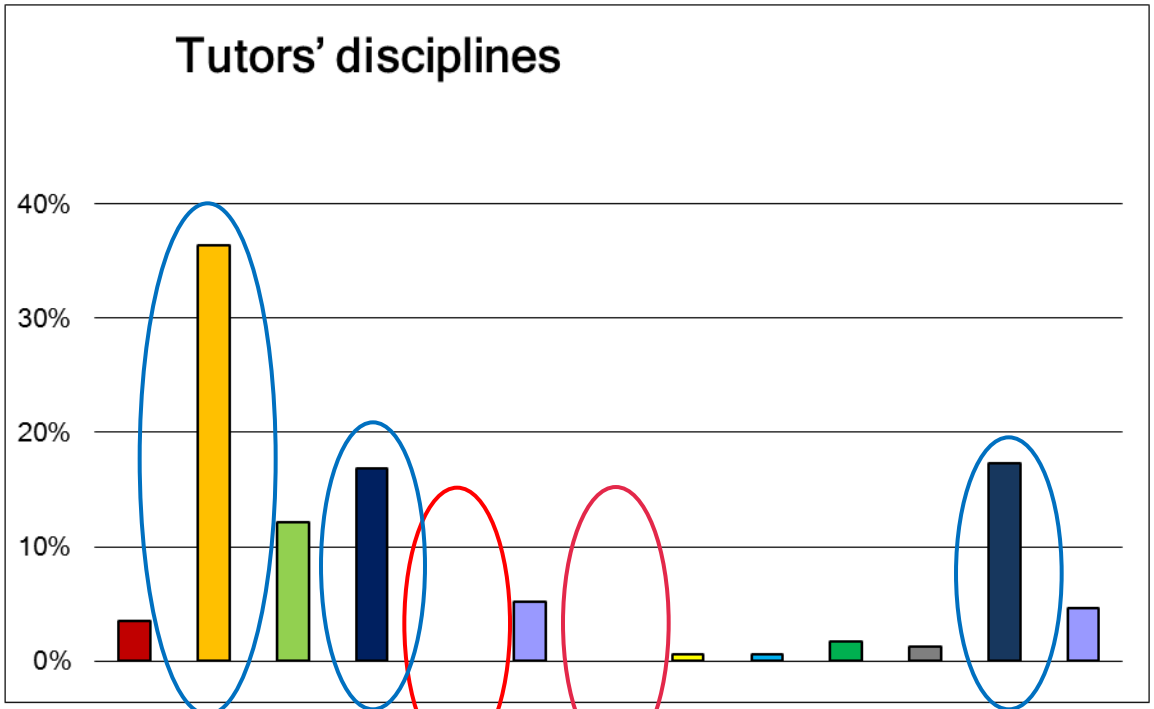
Yet…

- ‘graphic literacy’ is seldom taught in writing classes – ***why?***
- Most applied linguists are ‘trained in the humanities, where words are central to disciplinary values and argumentation’ Johns (1998:183)
- Tutors may ‘find themselves relying on disciplinary norms they are familiar with’ (Gardner and Holmes, 2009: 251)
- There’s often a concentration on ‘linear text’ (Johns, 1988: 183) rather than on the interaction of visuals with text.

Survey of writing tutors

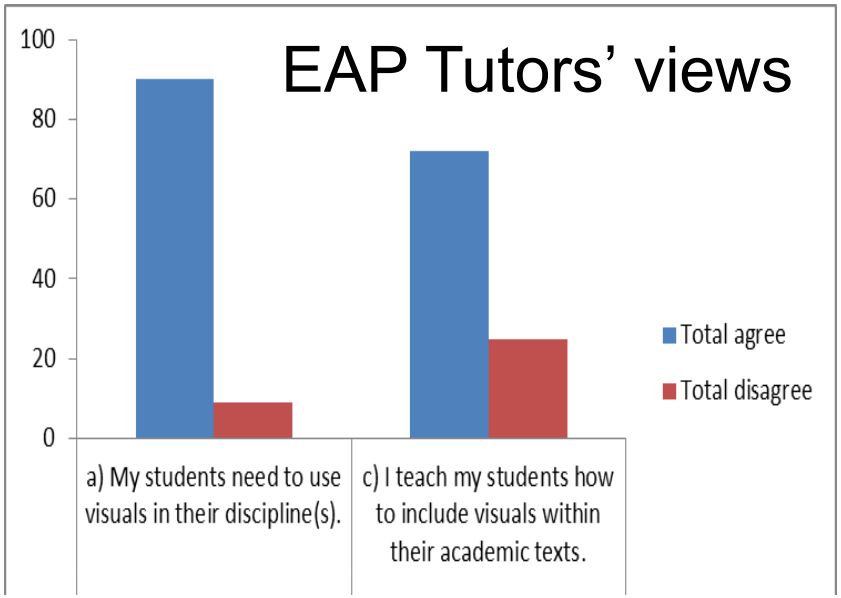
- 219 responses
- 87% of respondents teach in universities
- 60% have been teaching for 10 years +
- 50% + have a Masters degree in Applied Linguistics or Education
- 20% teach at foundation level, 36% UG in-sessional, 34% postgraduate
- Teach a mix of L1 English only, L2 English only, and both L1 and L2 English students





- Business and Management
- Arts and Humanities
- Social Sciences
- Education (including Linguistics)
- Engineering,Technology and Design
- Science
- Computing and IT
- Health and Social Care
- Environment, Development and International Studies
- Law
- Mathematics and Statistics
- Languages
- I'm not sure what category to choose/I don't know

Teaching the use of visuals



- 'The visuals are too complicated and student specific for me to know thoroughly and they know them better.'
- 'I don't know much about their individual subjects - just general knowledge or what I pick up from them.'

- 'On the presessional course in the UK I taught on, lists were certainly discouraged and little explicit attention was paid to integrating visuals into writing.'
- 'I have students do an ethnography of writing in their field, so that they can answer these questions.'
- 'We are often quite detached from the disciplines because our students go into so many different spaces after completing foundation'
- 'Some students are permitted to use these features and some not, so for this reason it is not sensible to teach them.'

Implications for practice: Writing tutors

- remain open-minded as to what might be acceptable;
- include ‘graphic literacy’ in academic writing classes;
- research writing in their discipline (cf. Johns', 1997, plea for students to become researchers of their disciplines' practices);
- search corpora (e.g. BAWE, MICUSP) for particular discipline features;
- collect exemplars of the writing their students are asked to produce;
- move beyond lexicogrammatical considerations such as the acceptability of *I* or the choice of passive or active voice to considering assignments holistically

  (e.g. Is it ok to use a table to display results or should these be given in prose? Can the conclusion be presented as a bulleted list? If images are given, can a lengthy caption be included?);

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