

Students' views of language use at two different science programmes Results of a comparative study based on a questionnaire

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Abstract

This paper presents the results of a questionnaire based on students' views of their language skills, learning strategies and how language is used in their undergraduate programmes. Both concern science education: the science teacher programme, School of Teacher Education, and the biomedical analyst programme, School of Health and Society. A total amount of 34 students answered the questionnaire, nine of which are teacher students and 25 biomedical analyst students. (Translation of the questions and the results in percentage: See appendix). The answers give an interesting hint of two rather different language cultures at these two undergraduate programmes.

Introduction

To get an idea of students' views of language habits a questionnaire is a relevant starting point for a research project aiming at getting a closer understanding of how students develop subject specific academic language knowledge during their studies (3 vs. 3, 5 years of length). In a final thesis students also at vocational programmes like these two, today are expected to prove their proper subject knowledge using an adequate academic language in a final thesis. The Swedish governmental arguments for the academic skills required at these formerly very practically designed programmes, are above all the fast changing society where all professionals continuously are considered to need updating their professional skills and reflecting over their work practices. Many of these students often do not understand the importance of developing academic language skills for the practical work they expect to meet and practise in the future in the science classrooms or the medical laboratories. The double requirement, in this case the development of practical skills as well as the academic skills, however, for many of them is an unexpected challenge. To a very large extent the academic skills required are based on the language typical of scientific contexts. Moreover many of the students are second language learners, a fact that does not make it easier to achieve the required language goals. Still another complicating aspect is that a great deal of the course literature is in English.

Research methods

A questionnaire is an appropriate way to gather information about the participating students' backgrounds and their opinions of the language used in their study programmes. It also makes possible the choice of a cohort of students for a closer study further on. The research methods will otherwise be based on sociosemiotic ethnography (Vannini, 2007), where qualitative data is collected: observation protocols of different language practices, iterated interviews with a few representative students and also texts will be collected, used and produced in the professional contexts of each programme.

Background

Today it is well known among language researchers that the tools for meaning making are context and subject specific (Halliday, 1994, Johns (ed), 2002, Schleppegrell, 2004). Subjects fulfil different purposes and are hence constructed differently. Language tools used in science are those discursive tools needed for definitions, classifications, lab reports and explanations. Where science subjects aim at describing and explaining the organisms and the world, human sciences on the contrary aim at understanding how human identities are constructed differently, as to time, gender and class, etc. These subjects are hence differently constructed, mainly by narrative language tools.

In academic contexts written language is still considered the most important language tool, though the status of the written language in fact is undergoing changes (Baynham, 1995). New technology brings new ways of meaning making. The expression "the great divide" (used about written language skills among people – the divide is the difference between literate and illiterate people in the world) is challenged by new literacy practises. The fast changes today might be due to the impact on young people of the new language tools used in new media (Mediappro, 2007).

Meaning making processes in science are linguistically very complex, and researchers have found that multimodal language tools are far more often used than oral or written language alone (Kress, 2003, Kress & van Leeuwen, 2001). Among such tools different visual representations like figures, diagrams, tables and pictures can be mentioned. Thus, understanding the school science text books today means that you need to consider the

combination of different modalities used. It might sometimes be true that “a picture call tell more than a thousand words”, but very often pictures tell us something else than words do, and they are simply used to fulfil other functions (Kress & van Leeuwen, 2001). Cooperation between linguistics and science researchers might shed a light on how students, for instance, combine language tools to make meaning and this in turn might have an impact on the way we assess students in educational science contexts in the future.

Participants

The teacher students participating in the project are totally nine, 8 female and 1 male. This is the total amount of students applying for science teacher studies (children up to 12 years of age) last autumn. The biomedical students participating are 25, 19 female and 6 male students. This is far from the total amount (around 50) of students accepted for the biomedical analyst programme last autumn. These were the students present at the day when the questionnaire was made. The students had a science lecture which was not obligatory.

The questionnaire was filled out in close connection to an early morning lesson or lecture in both groups. The researcher was present, and the project was shortly presented for the students. They also got a written argument about the project and the normal ethic research rules as to their participation.

The results of the questionnaire

The questionnaire first offers some important background knowledge about the students. Three of the teacher students have Swedish as their second language; six Swedish as their first. Twenty of the biomedical students have Swedish as a second language and five have Swedish as their first language. The first language represented is Persian, Arabic, Romanian, Spanish, Hebrew, Italian, English, Macedonian and sign language. Many of the biomedical students have arrived in Sweden as refugees or close family members to refugees as teenagers or even adults. This of course has consequences for their second language skills. The immigrants among the teacher students were either born in Sweden or came at an early age.

The age of the students is between 19 and 44. Many of the teacher students are rather young, about 22-23 years old, whereas the age among the biomedical students is more widely spread. The students have very different study experiences before they started this programme. Many of them have already experienced university studies of different kinds and lengths, or they have working life experiences of very differing kinds (from working with horses to ICT).

The questions and the answers

There are two types of questions: closed and open ended. All questions are not always answered by all students, and sometimes students give more than one answer to a question. The translated questions and the results in percentage where possible, are presented in the appendix. Below the similarities and differences are described and shortly discussed.

The similar answers concern the estimations of the students' language skills and what they consider typical for the subject specific language. A great majority of both groups is rather satisfied with their language skills in Swedish as well as in English. However, the teacher students seem a bit safer in their Swedish language use. As to the English language skills the results show the opposite. One could expect the opposite here because of the amount of students with Swedish as their second language. A very great part of immigrants in Sweden come from countries where the English language is not as important a part of their education as it is for the Swedish children. The opportunities practising English usually is less frequent in the countries immigrants have left for Sweden today. In this case the results can at least partly be explained by the language backgrounds of these students. They do not belong to the most common immigrant groups in south Sweden (Arabic speaking). One of them even has English as her/his first language. Anyway, 20% of both student groups are unsatisfied with their English language skills. This is worth noticing because of the great amount of course literature in English, especially in the biomedical education. The question is relevant to ask because in both groups some or a great part of the course literature is in English.

As to their science skills the students estimate them as rather high. Nobody among them finds his/her science skills insufficient. This is of course what one would expect considering their choice of study programme. A discussion with the teachers, though, indicates something else, but this might get an answer later in the research project.

Both student groups also consider language skills important for their studies and their future jobs. They also give rather similar answers to the questions considering the importance of visualizations in their study programme. Both groups consider visuals a typical kind of language in their subjects, and they also seem to have almost equal opinions about getting help to understand science phenomena and processes when described visually.

To sum up the similar answers concerning the students' opinions about their language skills, they seem to be quite content with their subject knowledge and how they cope with the language. One explanation to the minor

difference between the teacher students and the biomedical students as to their Swedish language skills could be the differences as to their first languages and the length of the time spent in Sweden for the Swedish as a second language learners. According to Thomas and Collier (1997) it takes at least 5-7 years to learn school subjects in their second language. Among the biomedical students a few have arrived in Sweden as refugees only some years ago, as teenagers or above in age. It is quite normal that their knowledge of Swedish is not as good as for those immigrants who spent many years in Sweden or those born here, which in fact a great deal of these students were. That some of the biomedical students are good at English is due to their language background. On the whole, the answers as to the above mentioned questions are quite similar.

Different answers

As to the rest of the questions with closed answers the differences concern how the students estimate their language use in different language practices in their respective programmes. They also differ as to strategies used in case they need linguistic help and also as to their considerations about the responsibilities as to success or failure.

As to language use in different language practices the biomedical students seem to estimate their capacities a bit lower than do the teacher students. As to oral individual language use there are 8% among the biomedical students who say they do not cope very well orally. Also as to written tasks the biomedical students find it more difficult than do the teacher students (20% against 11,1%). The biomedical students according to their answers also make use of visualizations more often than do the teacher students. 29% of them answer that they very often do use visualization where the amount here is 0% for the teacher students.

There are also differences concerning the answers about learning strategies, the difficulty of the course literature, the time spent on tasks, and the responsibility for success or failure. Interestingly, the groups seem to use different strategies when asked about what to do if they have language difficulties. As many as 43% of the teacher students would ask the teacher for help, where only 17,6% among the biomedical students would use this strategy. Also a greater percentage of the biomedical students would ask a mate to help them solve language problems. Here the figures are 44,1% for the biomedical students, against 28,6% among the teacher students.

Astonishingly, also the teacher students seem to rely much more on the teacher for their success. Here 30,7% of the students estimate that the teacher is important for their success, whereas among the biomedical students only 15,2% give this answer. The mates and the family seem to be more important for the teacher students as to this question than for the biomedical students. Here the figures are 15,4% for the teacher students, but only 9,1 for the biomedical students in both cases. Both of the student groups give themselves the greatest importance for success or failure.

Also the biomedical students seem to find the course literature more difficult than do the teacher students. No one of the students seems to find the literature too difficult, but many among them answer that it is difficult, whereas the teacher students to 88,9% answer that they understand most of it.

There are also differences as to time spent on tasks at home. Among the biomedical students 44% estimate time spent on this more than one hour daily, against 0% among teacher students. 0% of the biomedical students spend less than one hour every day on these tasks, where 12% of the teacher students answer that they spend less than an hour every day.

Tom sum up the differences, they have to do with language use, learning strategies and work with literature. The biomedical students' answers implicate that they are not quite as sure in their language use and that they spend more time on their studies as do the teacher students. The two groups also seem to have different opinions as to the importance of the teacher for their study success, and they rely unequally on their families and mates for the results of their studies.

Some reflections to this are the amount of time spent at the university with teacher led teaching. The biomedical students spend a lot more time at the university than do the teacher students, and the same counts for the teacher lead teaching hours. This is obvious when studying the schedule for the both groups of students. Also the teacher students work far more together in groups on their own, discussing literature and solving problems together. As to the biomedical students they hitherto have not been given other opportunities for group discussions than in the laboratory, working in pairs or small groups of three together. The language used during laboratory work is to a great extent procedural, which means that the language used mostly is accompanied by doing the laboratory work on the same time. This in turn means that they do not have to use many of the topic typical content words.

Answers to some of the open ended questions

There are a few questions with open answers (4, 6, 7, 12 and 16). Two of them will be discussed here. The explanation to this is the interest in getting an idea of how students describe the language activities going on in their study programmes, because research repeatedly shows that language needs to be actively used by language

learners in many contexts to be properly learned. All students are during their studies language learners to a certain level, and even more so if the language is not the first language or the language of every day use.

In questions 4 and 16 the students are asked to exemplify the language practices at the university, and outside the university. Here students normally give more than one answer/example. In table 1 (question 4) and 2 (question 12). The answers are summarized using the verbs or adverbs mentioned by the students. All student answers given are in the table, which explains the many iterations. The reason is to try to find out how students describe the language cultures of their programmes. The language practices mentioned might give a hint about how actively the students are expected to use the subject specific language. The answers of the biomedical students are written in bold type.

Table 1. Language practises in two different programmes according to the students

Speaking	Reading	Writing	Listening	Counting
discussing	reading books	writing	understand	calculate
explaining	reading Eng.course	a reading log	interpret	calculate
asking questions	literature	writing	understand	calculate
communicating	reading	taking notes	understand	
telling facts	listening	written tasks	lectures	
explain answers	reading course		understanding	
explaining			t eacher's lectures	
explanations	literature		must understand	
explaining to others	reading while	writing lab.	tasks	
speaking with supervisor		reports	listening	
explain something	be able to read	writing correct		
talking to mates	course literature	answers		
oral tasks	be able to read	examinations		
working with mates	(interpret) tasks	taking notes		
talk to the teacher	reading tasks	write answers		
express myself	read books	on examinations		
explain experi-		filling in questionnaires		
ments	the course literature	taking notes		
explaining diff.	much book reading	during lectures		
bodily processes		writing scientific		
		reports		
		reproducing words		
		on the black board		

The answers of the two groups differ and they point at different language cultures of each of these programmes. They indicate that the teacher education is a far more oral culture than is the biomedical analysts' programme. The teacher students are talking and discussing, explaining and working in groups with their mates, they have oral tasks. They read books, but the following discussions seem to be more common and important. Their writing habits are also more informal; they write their comments while reading a common book, or they take notes.

The answers of the biomedical students point at a much more heterogenous linguistic landscape. There are more different language practices mentioned, but the most part of them seem to consider reading and writing activities, indicating individual communicative acts and a far more monological teaching culture. The activities seem to be trying to find "the right answers" through reading and writing, not more creative problem solving tasks. They hardly ever mention working in groups discussing some scientific questions.

These answers are given during the second study semester, and they might not yet have experienced all language practices of the programme. But so far the language cultures seem to be interpreted very differently by the students.

Answers to question 12

Question 12 considers the learning strategies the students say they usually use in order to learn the content of the courses. In table 2 all student answers are written. The answers given by the biomedical students are also here written in bold style.

Table 2. Learning strategies of two different groups of science students

Talk	Read	Write	Listen
oral use	reading my notes skimming rereading reading again writing a lot rereading many times reading and writing	writing rewriting notes taking notes underlining taking many notes working through writing a lot	
discussing studying with friends asking myself questions (why?how?) discussing with a mate repeating using the words when talking to others	reading through the English course book rereading many times reading and writing reading literature looking up the answers in the course book reading and writing	taking notes writing down underlining rewriting notes marking important parts of texts taking lots of notes writing while reading summarizing and trying to understand what it is about	coming to lectures listening to the teacher

The question concerns how the students figure that they learn the content. Interestingly here the biomedical students mention using oral strategies like talking and discussing with their mates more than during time spent at the university. The biomedical students also seem more goal directed than do the teacher students. They seem to know more about different learning strategies, and their answers point at a more active individual learning. They mention underlining important parts of texts, using important words (concepts), looking up answers, and they combine writing and reading. The answer “coming to lectures” is not as strange as it might seem. The lectures are optional, but the laboratory work obligatory. Coming to the lectures actually means that they choose to come to listen to how the teacher structures the content to help them understand the content better when studying on their own later.

Conclusions

The results of the questionnaire must be seen in the context described above. They are not possible to generalize, but can only be seen as answers from these students, and answers given in a certain situation. They are to be considered as the starting point for a research project, which means that the intention is to get some background knowledge of the students and how the students understand the teaching and learning cultures at this point of the their study programme. The answers so far indicate two different language cultures, what might be important for the further research design. The questionnaire has given rise to the following questions out of which some will be chosen for a closer and continuous study:

- How do the textbooks used construct the subject? What language tools are used? (verbal, visual, other tools? Alone or in combination?)
- How do students really understand and use verbal and visual representations typically used in science contexts? How do they interpret multimodal texts? What do students consider difficult?
- In what ways does the teacher lead teaching time help the students in their language struggle? Is there explicit teaching about language?
- How do the students develop the academic language required specially in the final thesis?
- In which learning contexts are students given the opportunity to use the subject specific language?

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Appendix

Translation of the questionnaire and a summary of the results in percent of each student group (**bold** figures = biomedical analysts).

1. How do you consider your skills in the following languages:

	Not good enough	Rather good	No problems	Very good
Swedish	0 0	0 25%	44,4% 25%	55,6% 50%
English	25% 20%	25% 28%	25% 44%	0 8%
Sciences	0 0	37,5% 41,7%	62,5% 50%	0 4,3%

2. How important do you consider language skills for a successful education?

It does not matter	Not very important	Rather important	Very important
0 0	0 4,2%	66,7% 41,7%	33,3% 54,1%

3. How important do you consider that language skills in the job you have chosen

It is not important	Not very important	Rather important	Very important
0 0	0 4,2%	44,4% 41,7%	55,6% 54,1%

(4. What kind of language practises have you met so far in yours studies. Exemplify them.)

5. How does your language function in the following situations?

	Not good at all	it works ok	It works out well	It works very well
When working orally in pairs	0 0	0 16%	33,3% 28%	66,7% 56%
When working in pairs with a written task	0 0	0 16%	55,6% 36%	44,4% 48%
When working orally in group	0 0	0 27%	55,6% 19,2%	44,4% 53,8%
When working with a written task in group	0 0	0 24%	62,5% 28%	37,5% 48%
When you present something orally alone	0 8%	22,2% 25%	55,6% 21%	22,2% 46%
When you do a written task by yourself	0 0	11,1% 20%	44,4% 28%	44,4% 52%

(6. Is there any kind of task/s you find very difficult? Which one/s?)

(7. Is there something you think your teacher/s should know about your language skills?)

8. Which strategy do you use if you get language difficulties

I don't care	I try to solve them by myself	I ask a mate	I ask the teacher	Other strategy..
0 0	21,4% 38,2%	28,6% 44,1%	43% 17,6%	7% 0

9. Who/What is most important for you to succeed in your studies?

Myself	my family	My study mates	The teacher	Other reason
30,7% 51,5%	15,4% 9,1%	15,4% 9,1%	30,7% 15,2%	7,7% 3,0%

10. What is you opinion about the course literature used in your programme?

I understand everything	I understand most of it	It is difficult	It is very difficult
0 3,8%	88,9% 69,2%	11,1% 26,9%	0 0

11. How long time do you work with your tasks every day – outside the university

Less than 1 hour	About an hour	1-2 hours	More
0 12%	25% 12%	75% 24%	0 44%

(12. Do you use any special learning strategy? Describe...)

13. What do pictures, tables or diagrams mean in your subject?

1. I never thought about it	2. They are not important	3. They make the content more concrete
0 4%	0 4%	33,3% 36%

4. They are typical for my subject and have different functions

66,7% **50%**

14. What do these visuals mean for your understanding of the subject?

I don't know	Nothing special	They sometimes help me	They help me a lot
0 8%	0 4%	11,1% 12%	88,9% 76%

15. How often do you use these visuals in different tasks by yourself?

Never	Seldom	Quite often	Very often
0 4%	22,2% 28%	77,8% 40%	0 29%

(16. In your opinion how could teachers help you with the language?)

17. What is your opinion about this research project?

I don't know	It is ok	Rather important for me	Could be important for others
10% 3,8%	30% 46%	10% 11,5%	50% 38,5%

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