

# IDEAS FOR UNIVERSITIES

BY

PAUL MC KEVITT,  
B.Sc. (Hons.) (Dublin), M.S. (New Mexico), Ph.D. (Exeter)

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I certify that all the material in this dissertation which is not my own work has been identified and that no material is included for which a degree has previously been conferred upon me.

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Dr. Paul Mc Kevitt

Lé  
Peter, Rose, Peádar, Tara, agus Mícheál



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# Classic and Romantic Knowledge

“In terms of analogy, Classic Knowledge, the knowledge taught by the Church of Reason, is the engine and all the boxcars. All of them and everything that’s in them. If you subdivide the train into parts you will find no Romantic Knowledge anywhere. And unless you’re careful it’s easy to make the presumption that’s all the train there is. This isn’t because Romantic Knowledge is nonexistent or even unimportant. It’s just that so far the definition of the train is static and purposeless. This was what I was trying to get back in South Dakota when I talked about two whole dimensions of existence. It’s two whole ways of looking at the train.”

– Robert S. Pirsig (1974)<sup>1</sup>

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<sup>1</sup>See Pirsig, Robert S. (1974), “Zen and the art of motorcycle maintenance: an enquiry into values,” New York: William Morrow and Company (p. 276).



## Ideas for universities

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### Abstract

I start off by providing some background on my personal formal experiences of education and by surveying others' views on education. The formal experiences are from five universities at which I have been educated and/or employed. The survey of others' views includes philosophers, contemporary academics, academic managers and popular scientists whose ideas have struck me as being particularly relevant. Also, I present the IntelliMedia 2000+ project at Aalborg University, Denmark which I am directing and which provides a context for my educational practice. Next, based on this background, I characterise education as either *Classic* or *Romantic*. Classic university education emphasizes learning through monologue and remembering and regurgitation of facts which are reinforced through traditional assessment methods. Romantic university education emphasizes learning through dialogue, groupwork and active learning which are reinforced through more interactive assessment methods. I present ideas for universities based on a balanced integration of Classic and Romantic education and argue this will provide for stimulating more thinking and creativity. The ideas have been influenced by my personal formal and informal experiences of education, others' views, what I have learned on the Sheffield M.Ed. course and by the *unique Aalborg style* of education. I show how I am implementing the ideas in my practice through direction of IntelliMedia 2000+, my teaching and research, and also through a number of international curriculum development projects I am participating in. I give evidence that the ideas are successful, relate them and their implementation to group discussions and readings from the Sheffield M.Ed. course, and conclude with some recommendations for their implementation in universities.

# Chapter 1

## Introduction

I have spent the last 18 years (81 - 99) studying and working at universities and hence education has been of interest to me for some time. I have decided to present my experiences of university education, a survey of others' views on it, my idea of what it should be, how I am implementing that idea in my practice and some recommendations to universities for 2000+. In this introductory chapter the ideas and their implementation are motivated and an overview of the dissertation is given.

### 1.1 Educating me

My formal experiences of education come from having been educated and/or employed at five universities, four of which are in Europe and one in the USA. I have received degrees from three of these universities and been employed at three of them. My employment at universities means I have performed all the usual activities of teaching, supervising and assessing Bachelor's, Master's and Ph.D. students, and research and administration duties which all contribute to my experiences. Other educational experiences come from international education meetings I have attended where I have been involved in devising education strategies. These include EU Socrates projects in the area of language and speech and EU Tempus projects to cooperate with Eastern Europe. Also, experiences with presenting my research at international conferences and summer schools, organising conferences, reviewing papers and books for conferences and journals, and being editor of a journal all add to my experiences.

Informally, I have been influenced by the many academics I have met at universities from different cultures and countries but also from the many non-academics I have met and from general media coverage of educational issues. I have been influenced by the writings and ideas of others such as the Philosophical work of Newman, Stevenson, Wilde, Pirsig, and Nachmanovitch, contemporary academics such as Feynman, Schank, Kjærdsdam and Enemark, Ramsden and Rowland, academic managers such as Triggle and Downer and popular science writers such as Horgan,

Goleman, and Cole.

The Sheffield Master's course on Education (M.Ed.) and guidance from Stephen Rowland has had a large influence on my thinking and educated me about education. The various readings and group discussions have opened my eyes to theories and practice of education.

## 1.2 Motivation

This is not the first time I have decided to write about education. My first writings about education are found in Mc Kevitt (1995a, 1995b) through frustrations with the physical and social context of University College Dublin (UCD) and its impersonality, to the way in which tutorials were presented as lectures. My very first academic paper (see Mc Kevitt 1987) focussed on the topic of how computers have been used in computer aided instruction, with specific reference to natural language interfaces where people can communicate in natural languages like English with computers. This interest in education became refuelled again in 1992 at Sheffield University, England when the M.Ed. for University Lecturers came to my attention. The goals of the M.Ed. course stressing active learning, groupwork as well as focussing on curriculum design and assessment provided an avenue for me to release frustrations with the existing education system at most universities but also my disbelief at the UK government's approach to the (mis)management and funding of higher education.

Hence my main interest in presenting this work is to put in writing my ideas of what university education should be and to release frustrations with current fashions on education.

## 1.3 Ideas for universities

Here, the central idea for universities is that there should be balance so that the learning of facts can be integrated with the encouragement of thinking and creativity. Too much university education today focusses on the rote learning of facts rather than stimulating new ideas.

## 1.4 Overview

Chapter 2 presents my formal educational experiences, others' views on education, and the IntelliMedia 2000+ project at Aalborg University, Denmark which I am directing and which provides a context for my educational practice. My experiences with university education are described, looking at the similarities and differences between them. The survey of others' views includes philosophers, contemporary academics, academic managers and popular scientists whose ideas have struck me as being particularly relevant.

Chapter 3 presents my characterisation of university education and ideas for what a university should be. I classify education as *Classic* and *Romantic* and discuss the essential differences

between the two and how assessment is used to reinforce these differences. I then move on to present ideas for universities which argue for a balanced integration of Classic and Romantic education.

Chapter 4 looks at my experiences with implementing ideas for universities in my practice from the point of view of teaching, research and curriculum development. Examples of practice as part of IntelliMedia 2000+ are given and I also discuss a number of international curriculum development projects I am participating in. Evidence of successful implementation of the ideas is given.

Chapter 5 concludes with a summary, relations with others' ideas, some recommendations for implementing the ideas in universities and discussions of what can be done for the future. It is concluded that evidence shows that the ideas are successful and more work needs to be done on their implementation in universities.

Appendices A - E give examples of teaching, research and curriculum development practice in order to demonstrate evidence of implementation of the ideas and their success.

## Chapter 2

# Background

Here I start by introducing my own educational experiences from universities at which I have been formally educated or employed. Next, others' views on education are given. Finally, I introduce the IntelliMedia 2000+ programme at Aalborg University, Denmark which I am directing and which provides an umbrella context in which my education and research practice is taking place.

### 2.1 My educational experiences

Here I discuss education experiences from the point of view of five universities at which I have been formally educated or employed. Four of the universities are in Europe and one in the USA. I have received degrees from three of the universities, been employed at three of them, and am presenting this dissertation in part fulfillment for a degree at one of them (M.Ed.).

#### 2.1.1 University College Dublin

I studied at University College Dublin (UCD), Dublin, Ireland for four years (1981 - 1985) and obtained my B.Sc. (Hons.) degree in Science with a specialisation in Computer Science. In the first year of the science degree course I studied Mathematics, Biology, Chemistry and Physics, in second year Mathematics, Computer Science and Physics, in third year Mathematics, Physics and Computer Science and in fourth year, Computer Science.

The whole system of education at the University was very traditional and most assessment was conducted by traditional individual sit-down written examinations. There were practical elements to subjects in each year but these only counted for a minor proportion of the grade. Also, there were tutorials for mathematics in first and second year and for computer science in second year, but these tutorials became traditional lectures much of the time as I have pointed out in Mc Kevitt (1985a). There were too many students and too few lecturers to enable much interaction between them.

The system was very competitive with many students battling to obtain high grades because

they all knew that only a proportion would obtain any given grade each year. For example, after first year examinations, approx. 70% of students failed at least one subject in their first year examinations and that meant repeating all of them in the resits. Even after the resits 40% of approx. 400 students had failed their first year. And students had already been pre-selected from secondary school examinations in a national competition to get into the university. Many students had found it difficult to make the transition from cosy secondary school to a large, impersonal and very competitive university with over 15,000 students and at that time the largest university in the British Isles. Students continued to be selected out by failing at fences in second and third year.

Second year grades were used to select those who would go on to do the four year honours degree (those who got 55% in their honours subjects) and hence qualify to do Ph.D.'s or get good jobs in industry, and those who would do the three year general degree and maybe after that do a one year Higher Diploma (H.Dip.) in Education and get a job as a teacher. In the final fourth year for the honours degree in Computer Science the 30 odd students were more like machines than people. The student's grade in the final year was taken from that year's examinations only and hence there was no cumulative grade over the 4-year period of study.

Two of the best students (one with a I, the other with a 2i) in the final year honours class of 30 odd went on to do Ph.D.s but both of them had problems, one failing at his viva and ending up having to rewrite and completing 12 years after the B.Sc., the other completing 13 years after the B.Sc. However, not being one of those with the highest grades in the class, I ended up obtaining my Master's degree (3 years later) and Ph.D. (3 further years) in record time. This, I believe, may be more evidence that those who get the top grades in traditional assessment are not necessarily those who will do best in independent research which involves thinking and creativity.

### 2.1.2 New Mexico State University

I studied at New Mexico State University (NMSU), New Mexico, USA four three years (1985 - 1988) and obtained my M.S. degree in Computer Science. I studied mainly the same subjects as my final year at UCD, but in greater detail.

Here, the university system was less traditional. Most courses were assessed through traditional individual sit-down written examinations but some through active learning involving seminar presentations or working on an extended project which counted for a considerable proportion of the grade. Since this was a Master's degree one had to do a Master's dissertation which allowed for more thinking and creativity. Although I had originally decided to finish my formal education after obtaining the Master's, I became so much interested in research that I decided to go on to do a Ph.D.

The expression of assessment results were different in the USA. One obtained a grade point average (GPA) which was an average of grades obtained in all courses over all years. Also, students did not fail so often and even if they did go down in one course they could pull up by getting good

grades in another. Hence, a student's grade in the final year was an average over the complete duration of study. This was very different to University College Dublin where failing in one course meant repeating the lot in repeat examinations and where grades were not cumulative over the period of study.

### **2.1.3 University of Exeter**

I registered for my Ph.D. at the University of Exeter, England for three years (1988 - 1991) and obtained the Ph.D. degree in Computer Science. The Ph.D. degree in England (and all of the UK and Ireland) is obtained totally on the basis of independent research. I was not required to take courses as part of my Ph.D. which I would have had to do in the USA, and also to pass comprehensive written and oral examinations covering all subjects in the field.

While at Exeter University I had the opportunity to do some teaching and found that the system was on the whole traditional with individual sit-down written examinations. Like UCD, courses did have practical elements and these counted for a higher percentage of the grade than at UCD. Grades given in the final year were cumulative over a number of years of study.

### **2.1.4 University of Sheffield**

I was employed at the University of Sheffield, England from 1992 - 1994 as a Lecturer in the Department of Computer Science and then seconded to an EPSRC Advanced Fellowship (1994 - 2000).

The system of education at the Department of Computer Science at the University of Sheffield is traditional and most courses are evaluated through individual sit-down written examinations. However, unlike UCD and like Exeter, if students fail an examination in a course they resit only that examination. Many courses involve projects but they count for only a small percentage of the grade. Students must complete a final year project which counts for a percentage of the grade and is examined orally and through presentation. Grades in the final year are cumulative over a number of years.

I found it interesting that there were some courses which did not fit the norm of traditional education. One professor taught a course completely through active learning where students would present papers on given topics throughout the course. They were then evaluated on their presentations. Subsequently, I have taken up that idea and used it in my own teaching practice. Also, there were some courses where the project took up a much larger percentage of the final grade.

I attended the Master's in education (M.Ed.) course at the University of Sheffield, England for four semesters over two years (1992 - 1993). It was for me a non-traditional course. There were no traditional lectures and all meetings were conducted in a group with much dialogue with at least one tutor present. The tutors did take the role of coordinators but also partook in group discussions. Readings were a large part of the course which were intended to be read in our spare

time as well as being discussed in class. We were continuously encouraged to think and reflect and also to be open about our thoughts in the group meetings. This was a research approach to teaching in higher education and I was becoming a ‘born-again teacher’ (see Rowland and Barton 1994). The success of the Sheffield M.Ed. course is borne out in results from a survey presented in Rowland and Skelton (1998). The method of assessment reinforced the non-traditional style. Assessment was based on submitted portfolios and there was more a sense of meeting the needs of the course than one of pass/fail.

### 2.1.5 Aalborg University

I came to Aalborg University, Denmark in 1996 since the Institute for Electronic Systems established IntelliMedia 2000+ to focus on integration of spoken language and visual information processing at the same time as I obtained an EPSRC Advanced Fellowship to do the same. I have been involved in directing IntelliMedia 2000+ with respect to research, teaching and curriculum development.

Aalborg University has a balanced, tradeoff integration of traditional and non-traditional education. All degrees at the university are conducted through the *unique Aalborg style* of group organised and project-oriented education (see Kjærdsdam and Enemark 1994). 50% of the courses (basic courses) are usually evaluated through traditional individual sit-down written examinations and the other 50% through their use in projects (project courses). All projects are conducted in groups of 3-6 students, groups are decided for each semester and each group selects a project from a set of candidates. In any given semester 50% of the time is allocated to project work, 25% to project courses and 25% to basic courses. At the end of the semester the group is evaluated through submission of a project report and an extensive oral examination. Students may be asked questions individually in the oral examination. Project-related courses are examined in the oral through their relevance to the project. The system is also less competitive and more cooperative where students in groups are commonly given the same grade unless there is a clear case of misconduct by some student. A University education based on this unique style of education was something completely new for me and something I had always thought was called for throughout my educating years.

A detailed comparison of the Aalborg style of education as compared with traditional education at Twente University, The Netherlands by Pothof (1995) shows that Aalborg graduates are better in analysing and knowledge handling and consciousness of the context of problems whereas Twente graduates are more trained in analysis based on traditional scientific theories. Also, Aalborg graduates appreciate their education as more satisfying than those from Twente. Another finding is that Aalborg supervisors prefer graduates from Aalborg University in comparison to graduates from elsewhere whereas Twente supervisors have no preference between Twente graduates and those from elsewhere.

## 2.2 Views on education

Here we look at views on education as expressed by others. First, we look at a number of philosophical writers Newman, Stevenson, Wilde, Pirsig, Nachmanovitch and Dreyfus whose views on education are relevant here. Then, we look at some views on education from contemporary academics such as Feynman, Schank, Ramsden and Rowland. Next, we hear from University managers and academics, Trigg (Dean), Downer (President), and reactions to Bain (Vice Chancellor). Finally, we look at popular science writers such as Horgan, Goleman and Cole. Furthermore, in Chapter 5 we look at ideas for universities and their implementation (Chapters 3 and 4) in relation to a survey of views of authors of set readings from the M.Ed. course.

### 2.2.1 Philosophers

John Henry Newman published in 1852 *The idea of a University*, a collection of the inaugural lectures for the Catholic University together with other academic essays. His two basic principles were: (1) that knowledge must be an end in itself and (2) inseparability of research and teaching. How Newman's work applies to universities of today is examined in the deeply personal reflection of Pelikan (1992) where he shows how Newman's ideas illuminate and differ from current problems facing higher education. Newman (1852a) discusses the unity of knowledge and points out that truth is the object of all knowledge no matter what kind. He says that knowledge is the apprehension of facts and that there are no limits between parts of knowledge but one is ever running into another and as viewed by the mind are all combined together from mysteries of Divine Essence down to sensations and consciousness. Here, Newman is basically getting at the fact that knowledge cannot be separated into distinct compartmentalised boxes, but must be taken as a complete interdisciplinary whole. He notes that the tower of knowledge is so large that we can only hope to get partial views of it from different directions and our apprehension will depend on what is relevant and useful for us. He says,

“Summing up, gentlemen, what I have said, I lay it down that all knowledge forms one whole, because its subject matter is one: for the universe in its length and breadth is so intimately knit together that we cannot separate off portion from portion, and operation from operation, except by a mental abstraction and then again, as to its Creator, though He of course in His own Being is infinitely separate from it, and theology has its departments towards which human knowledge has no relations, yet He has so implicated Himself with it and taken it into His very bosom by His presence in it, His providence over it, His impressions upon it, and His influences through it, that we cannot truly and fully contemplate it without in some main aspects contemplating Him.”

Newman (1852b) discusses what is meant by *liberal* knowledge and says that a university may be considered with reference to its students or to its studies: and that the principle that all

knowledge is a whole is also important when attention is directed to the students. He proposes to answer the question of how teaching with focus on students carries the attribute of utility along with it. He notes that in the combination of colours different effects are produced by differences in their selection and juxtaposition and the traditional meaning of a branch of knowledge varies with the company in which it is introduced to the student. He says,

“If his reading is confined to simply one subject, however such division of labour may favour the advancement of a particular pursuit, a point into which I do not here enter, certainly it has a tendency to contract his mind. If it is incorporated with others, it depends on those others as to the kind of influence which it exerts upon him.”

He wishes that students get an interdisciplinary education and says,

“It is a great point then to enlarge the range of studies which a university professes, even for the sake of the students; and, though they cannot pursue every subject which is open to them, they will be gainers by living among those and under those who represent the whole circle. This, I conceive to be the advantage of a seat of universal learning, considered as a place of education. An assemblage of learned men, zealous for their own sciences, and rivals of each other, are brought, by familiar interdiscourse and for the sake of intellectual peace, to adjust together the claims and relations of their respective subjects of investigation.”

and this characterises for him, ‘liberal’ education. He goes on to discuss utility and true to his theme of interdisciplinary work he says,

“Particular sciences are respectively the basis of definite arts, which carry on to results tangible and beneficial the truths which are the subjects of the knowledge attained; what is the art of this science of sciences?”

He concludes by distinguishing (1) *useful* and (2) *liberal* knowledge and in the former case refers to how knowledge can be used for other ends and in the latter where knowledge is an end in itself.

Newman’s (1852c) definition of a gentleman is interesting because it defines someone who is the result of a good education. He says,

“If he engages in controversy of any kind, his disciplined intellect preserves him from the blundering discourtesy of better, perhaps, but less educated minds: who, like blunt weapons, tear and hack instead of cutting clean, who mistake the point in argument, waste their strength on trifles, misconceive their adversary, and leave the question more involved than they find it. He may be right or wrong in his opinion, but he is too clear headed to be unjust; he is as simple as he is forcible, and as brief as he is decisive. Nowhere shall we find greater candour, consideration, indulgence: he throws himself into the minds of his opponents, he accounts for their mistakes. He knows the weakness of human reason as well as its strength, its province and its limits.”

In giving the definition of a gentleman Newman is setting out the parameters of behaviour of someone engaged in dialogue for education.

Stevenson (1881) makes the point that idling can be worthwhile and we can actually learn a lot by doing so. He notes that idleness does not result in doing nothing but is doing lots not recognised by the ruling class of the time. He says, “Idleness so called, which does not consist in doing nothing, but in doing a great deal not recognised in the dogmatic formularies of the ruling class, has as good a right to state its position as industry itself.” and “It is a sore thing to have laboured along and scaled the arduous hilltops, and when all is done, find humanity indifferent to your achievement. Hence physicists condemn the unphysical; financiers have only a superficial toleration for those who know little of stocks; literary persons despise the unlettered; and people of all pursuits combine to disparage those who have none.” He says that there is no doubt that people should be idle in youth and most boys pay so dearly for their medals that they never afterwards have a shot in their locker. He adds,

“And the same holds true during all the time a lad is educating himself, or suffering others to educate him. It must have been a very foolish old gentleman who addressed Johnson at Oxford in these words: “Young man, ply your book diligently now, and acquire a stock of knowledge; for when years come upon you, you will find that pouring upon books will be but an irksome task.” The old gentleman seems to have been unaware that many other things besides reading grow irksome, and not a few become impossible, by the time a man had to use spectacles and cannot walk without a stick. Books are good enough in their own way, but they are a mighty bloodless substitute for life. It seems apity to sit, like the lady of Shalott, peering into a mirror, with your back turned on all the bustle and glamour of reality. And if a man reads very hard, as the old anecdote reminds us, he will have little time for thought.”

Mr. Worldly Wiseman chances upon a lad resting in the countryside smoking pipes and listening to birds singing and asks him why he’s not in class plying books and the lad replies that he is learning, but in a different way, and not about mathematics, metaphysics, language, trade but Peace/Contentment by ‘root-of-heart’! And Mr. Worldly Wiseman replies with much passion, ““Learning, quotha!” said he; “I would have all such rogues scourged by the Hangman!”” And Stevenson claims that this is the common opinion and facts are not facts but gossip unless they fall into a scholastic category. Stevenson says,

“While others are filling their memory with a lumber of words, one-half of which they will forget before the week be out, your truant may learn some really useful art: to play the fiddle, to know a good cigar, or to speak with ease and opportunity to all varieties of men. Many who have “plied their book diligently”, and know all about some one branch or another of accepted lore, come out of the study with an ancient owl-like demeanour, and prove dry, stockish, and dyspeptic in all the better and brighter parts of life.”

And he says of dead-alive, hackneyed people: “Before he was breached, he might have clambered on the boxes; when he was twenty, he would have stared at the girls; but now the pipe is smoked out, the snuff-box empty, and my gentleman sits bolt upright upon a bench, with lamentable eyes. This does not appeal to me as being Success in Life.”

Basically, Stevenson is asking for balance in education and that one must experience life as well as reading about it. Also, he points to the arrogance and imbalance of those who have only been reading about the world. He is against the tradition of memorization and more for that of thinking and creativity.

Wilde (1990) made a number of statements on education but one struck me so much I placed it at the front of my Ph.D. thesis. He says,

“Don’t let us discuss anything solemnly. I am but too conscious of the fact that we are born in an age when only the dull are treated seriously, and I live in terror of not being misunderstood. Don’t degrade me into the position of giving you useful information. Education is a useful thing, but it is well to remember from time to time that nothing that is worth knowing can be taught.”

Wilde is also getting at the fact that he is in an age where Mr. Worldly Wiseman is taken seriously and where if everyone would be like him then there would be nothing to misunderstand. He says that to provide useful information is degrading — which goes back to one of Newman’s basic principles: knowledge must be an end in itself (liberal knowledge). And he hopes for creativity and thinking where the real worth of knowledge is when it hasn’t been taught.

Pirsig (1974) provides a book which for me gives an idea of what education should be. It is a simple story of a father and son whose travel across America by motorcycle turns into a quest for self-knowledge. With respect to *Quality* of the student he says,

“In a sense, he said, it’s the student’s choice of Quality that defines him. People differ about Quality, not because Quality is different, but because people are different in terms of experience. He speculated that if two people had identical a priori analogues they would see Quality identically every time. There was no way to test this, however, so it had to remain just speculation.” (p. 244)

On the subject of integrating scientific and artistic knowledge and how it should be seen, he says,

“But we know from Phaedrus’ metaphysics that the harmony Poincaré talked about is not subjective. It is the source of subjects and objects and exists in an anterior relationship to them. It is not capricious, it is the force that opposes capriciousness; the ordering principle of all scientific and mathematical thought which destroys capriciousness, and without which no scientific thought can proceed. What brought tears of recognition to my eyes was the discovery that these unfinished edges match perfectly in a kind of harmony that both Phaedrus and Poincaré talked about, to produce a

complete structure of thought capable of uniting the separate languages of Science and Art into one.” (p. 263)

Here, Pirsig stresses that the Sciences and Arts must come together at some point in the whole tower of knowledge which links back to what Newman says about the inseparability of knowledge and interdisciplinary thought. On the discussion of reductionism and interdisciplinary thought he has,

“In terms of analogy, Classic Knowledge, the knowledge taught by the Church of Reason, is the engine and all the boxcars. All of them and everything that’s in them. If you subdivide the train into parts you will find no Romantic Knowledge anywhere. And unless you’re careful it’s easy to make the presumption that’s all to the train there is. This isn’t because Romantic Knowledge is nonexistent or even unimportant. It’s just that so far the definition of the train is static and purposeless. This was what I was trying to get back in South Dakota when I talked about two whole dimensions of existence. It’s two whole ways of looking at the train.” (p. 276)

His distinction between *Romantic* and *Classic* Knowledge is a good one, and one which I steal for classifying education in this dissertation, and he points to reductionism as destroying Romantic Knowledge, which goes back to Newman’s point about all knowledge forming one whole. This reminds me of some discussions we had during English class at secondary school where it was argued by poets that analysis of poetry destroyed it (which is exactly what we were doing in the classroom). Of course, artists and others point this out too for those who analyse their art, etc.

Nachmanovitch (1990) discusses the meaning of creativity and improvisation and how we have gone, and can go, about them. Whilst discussing music in the introduction he shows how Mozart relied on improvisation but also how the formal concert halls of the nineteenth century put an end to improvisation - a move from Romantic to Classic! He focusses very much on the creative process, but also on how people can learn to get in touch with their own creative possibilities and abilities. He talks of the creative process being a spiritual and adventurous path where it is an emergent property of *free play* where one is freely playing without shackles and he bases much on the literature of Zen and the writings of William Blake. He says,

“ “Play” is different from “game.” Play is the free spirit of exploration, doing and being for its own pure joy. Game is an activity defined by a set of rules, like baseball, sonnet, symphony, diplomacy. Play is an attitude, a spirit, a way of doing things, whereas game is a defined activity with rules and a playing field and participants. It is possible to engage in games like baseball or the composing of fugues as play; it is also possible to experience them as *lila* (his italics) (divine play), or as drudgery, as bids for social prestige, or even as revenge.” (p. 43)

Like Pirsig, Nachmanovitch also asks what quality is:

“I found myself plunged into considering a whole set of questions that I think we must ask but cannot answer: What is quality? What is good? The enigma of quality in art brings up another word, which is to some extent out of date and therefore a bit quaint-sounding, namely, *beauty* (his italics). Our Pandora’s box pours out yet more enigmas: grace, integrity, truth. What does creative “mean”? Do we use the same word to describe a dedicated Sunday painter as we use to describe a Leonardo da Vinci? When we are creating in a hitherto unknown form — and even more so when improvising — how do we recognise when it is the real McCoy? How do we know whether or when we are fooling ourselves? What is it that calls forth the aesthetic response, and how do we test it? How do we point our gyroscope?” (p. 170)

Dreyfus (1998) presents a paper on why the Danish Philosopher, Kirkegaard would have hated the internet. It is due to what Kirkegaard meant by the Public and why he was so opposed to the Press. The focus of Kirkegaard’s concern was what Habermas calls the public sphere which, in the middle of the 18th century had become a serious problem for many intellectuals. Kirkegaard thought that the Public Sphere, as implemented in the Press, promoted risk-free anonymity and idle curiosity that undermined responsibility and commitment. He claimed this led to nihilism as it levelled all qualitative distinctions. Dreyfus claims Kirkegaard would have denounced the internet for the same reasons. Kirkegaard had two Nihilistic spheres of existence: (1) aesthetic and (2) ethical. In the aesthetic sphere the aesthete avoids commitments and lives in the categories of the interesting and the boring and wants to see as many interesting sights as possible. In the ethical sphere people could use the internet to make and keep track of commitments but would be brought to the despair of possibility by the ease of making and unmaking commitments on the Net. Nihilism is only overcome in the religious sphere by making a risky, unconditional commitment. Dreyfus says that the internet, however, would tend to undermine rather than support any ultimate concern in its risk-free simulated world. Dreyfus says,

“Kirkegaard would surely have seen in the internet, with its web sites full of anonymous information from all over the world and its interest groups which anyone in the world can join and where one can discuss any topic endlessly without consequences, the hi-tech synthesis of the worst features of the newspaper and the coffee house. On their web page anyone can put any information into circulation.”

### 2.2.2 Contemporary academics

Feynman (1992) produces a very humorous autobiography of his life as a brilliant Nobel-Prize winning physicist. One of the main messages in this book is that our methods of educating others are ineffective, but incorrect as well. One of his main contributions to Physics was that of introducing Feynman diagrams which help explain elements of particle Physics in a graphical manner, rather than with mathematical formulae. He tells a story of when he visits Brazil and finds

that many had memorized the basics of Physics in great detail and did well on exams but did not really understand these basics. Also, the Brazilian students had the ability to answer any question he asked but if he placed the question in another context they could not do so. They could not relate their knowledge to real-life examples. The students had memorised everything but didn't know what it meant. This is the rote-of-heart which Stevenson despises. Also, he couldn't get the Brazilian students to *ask* questions. The students would not ask each other questions in case of loosing face and Feynman advocates how useful it is to work in groups, to discuss questions and to talk them over so that everyone has a better understanding of things. His conclusion was that learning without understanding is meaningless. Another point which he stresses is that students should be taught to do experiments with scientific integrity and not to get "certain results". Also, much of his book is about how he kept trying to solve seemingly insoluble problems and most of the time succeeded.

Schank (1990) examines stories told by a wide range of people to discover the cultures, motives, memories and thinking behind them. With that information he believes he can create an intelligent computer with a human side; not the kind that can calculate complicated equations, but a computer that is interesting to talk to, one that knows what kind of stories to tell and when to tell them. Schank develops an interesting script theory from his earlier work in artificial intelligence (see Schank and Abelson 1977) on how people use mental scripts or stories for learning based on the context of specific situations. His point is that our interest in telling and hearing stories is strongly related to intelligence. His later book (Schank 1995) is about how computers can help people express themselves better and how storytelling can be a model for building communication experiences. He discovers how different types of narrative change interactive experiences. Schank has struck upon an important point here, that much of education comes from stories which people can remember and usually stories are about real-life experiences with humour and emotions, i.e. memories which people can hang knowledge upon.

Schank and Cleary (1995) have written a book and 'hyper-book' (book on the web and CD-ROM) about what is wrong with the education system in the USA, how to reform it, and especially about the role of educational technology in that reform. On education they discuss that the problem with education is that school at all levels is seen as a chore, a rite of passage to be endured rather than an exciting place where one can grow and learn. Rather than being excited in the classroom students have learned to fear it. They point out that learning by experience is better than learning by studying because it encourages one to think for oneself rather than learning what one is told.

They list the top ten mistakes in education, as schools believe: (1) they should act as if learning is disassociated from doing, (2) they have the job of assessment as a natural role, (3) they have an obligation to produce standard curricula, (4) teachers believe they ought to tell students what they think is important to know, (5) instruction can be independent of motivation for use, (6) studying is an important part of learning, (7) that grading according to age group is an intrinsic part of the

organization of a school, (8) children will accomplish things only by having grades to strive for, (9) discipline is an inherent part of learning, and (10) students have a basic interest in learning whatever schools decide to teach them. As solutions, Schank advocates active learning and self-directed learning through the use of multimedia software programs developed at his Institute for the Learning Sciences (ILS). For example, one computer program called the Sickle Cell Counselor is organised around a simulation which provides four activities: (1) asking experts, (2) doing lab tests, (3) calculating risks, and (4) advising clients. The program provides users with access via video to experts with whom users may have simulated conversations. A simulated blood lab is available where users can draw samples, view them under a microscope and perform a conclusive lab test. Hence, it is learning by doing! On active learning they say,

“Sometimes students can be their best teacher if they just have someone around to listen to the ideas they are coming up with. Of course, schools tend to allow very little time for such student reflection and even less time for teachers to just listen. Students rarely try out their thoughts on teachers because they know there is no possibility that the teacher would have the required time, the patience, and ability to reserve judgement. But when students are allowed to devise and pursue activities in which they are interested, they naturally generate ideas, hypotheses, and questions. They are ready to learn from their own ideas if we can find a way to help.”

In a personal note, Schank talks of why he cares about reforming the schools:

“I was a terrible student. In grade school, I got bad grades in ‘conduct’. I did not find school to be particularly interesting. My back of interest in what was being taught and the way it was being taught generally led me into endless confrontations with authority. I began to doubt my own intelligence as others who were more willing to play by the rules got better grades than I did. Later, as I began to study the mind, and learned more about the way it works, and met many people who had troubles in school similar to mine, I began to realize the problems I had in school were hardly unique to me.

When my own children went to school, I watched the same thing happen all over again to them. I had, by this time, become a professor at Yale University. Even so, I realized I would still have trouble getting As in school if I were taking classes rather than teaching them. I watched what happened to my children, who entered school eager to learn, but who later became anxious, troubled, and generally discouraged by the educational system. Watching them, I became convinced that the system simply does not work.”

On computer programs, he makes the point that by building the right ones we can deliver expert resources as students need them and also that can react to student’s decisions. At the Institute for Learning Sciences (ILS) they are building systems which interact with people in more

engaging ways than before. Children can try out things in worlds of their own making, flying their own ship to the moon, designing their own animal, or directing their own newscast. This technology allows the support of what is the most important part of a good education system: cultivation of individual initiative in students. On the terrible effect of grades he says,

“Given the opportunity, students at places like Yale and Northwestern will, on average, spend time using their intelligence to figure out how to get an A without doing the real work of the course and without thinking, rather than spending the same time thinking and exploring, regardless of what grade this may bring them. It isn’t that these students are not motivated, it’s just that they’re not as motivated to learn as much as they’re motivated to get good grades. Once you are grade-oriented in your thinking, it is difficult to stop thinking that way.”

Schank gets to the crux of the problem with the education system. Students are chasing grades and hence more interested in *Classic Knowledge* rather than being creative and developing new ideas, i.e. pursuing *Romantic Knowledge*. He sees good computer technology as a means towards stimulating Romantic Knowledge.

Kjærdsdam and Enemark (1994) present experiences within the natural sciences and engineering with respect to 20 years of the unique Aalborg style of education at Aalborg University, Denmark where all programmes are based on problem-oriented and project organised education. They say,

“The engineering education in Aalborg has been evaluated and compared with traditional engineering education. This was done by two international panels, we well as by external examiners, alumnus and their employers and undergraduate and graduate students. Evaluation assessed that there no differences in quality or level between engineers graduated from Aalborg University and the other Danish university engineering education in Copenhagen. But the evaluation also assessed significant differences between the profiles of the graduates from the two Danish engineering universities. The engineers from Aalborg were assessed to be stronger in problem-solving, communication, cooperation and general technical knowledge, while the traditional engineers were assessed to be stronger in specialist knowledge and technical methodology. The Aalborg engineering programme was assessed to be complementary to the traditional engineering programmes, serving slightly different needs for students and industry.”

(p. 9)

This Aalborg University system of education is a more interactive one where dialogue is encouraged through groupwork, problem-oriented and project organised education. This is the style of education which Newman, Stevenson, Feynman, and Schank would support. Kjærdsdam and Enemark (1994) say,

“In the old battle between those who think they possess knowledge - the sophists - and those who seek knowledge - the philosophists - problem-oriented project work stands

beside Socrates and the other philosophers. It is the attempt to solve the current problems within e.g. engineering which guides the students together with the teacher to the areas of knowledge and theories which are essential.” ... The educational system at Aalborg University was developed to ensure a dialectic relationship between academic theory and professional practice. This was to ensure greater adaptability of application between theory and practice for the purpose of problem-solving. The theoretical problems make up the engine which operate this educational process and ensures that the knowledge of our graduates is up-to-date.” (p. 13)

Here, Kjærdsdam and Enemark’s thinking on bridging the gap between teacher and student and links between research, teaching, theory and practice is what Newman, Stevenson, Feynman all would have liked. Then transmission of knowledge can become two-way rather than just one-way.

Kjærdsdam and Enemark’s go on to characterise the difference between traditional and project-oriented education,

“Traditionally higher education has been focused on rule-based disciplines with independent identities in their own contexts. In the discipline-oriented education, the special disciplines and theories, which are considered necessary/relevant for the specific subjects, are taught by means of set textbooks and lectures. The students become experienced in the use of these disciplines and theories through the exercises and case work which support these theories. ... Problem-oriented education, however, is based on working with unsolved, relevant and current problems from society/real life, e.g. the engineers’ professional activity in an environment where solutions to real problems are sought. By analyzing the problems in depth the students learn and use the disciplines and theories which are considered to be necessary to solve the problems posed, i.e. the problem defines the subjects and not the reverse. Organizing problem-oriented education as project work allows groups of students to choose problems and work with them, learning from each other.” (p. 16)

Again, we see a characterisation here between traditional learning by rote-of-heart a la Stevenson (Pirsig’s Classic Knowledge) versus the more innovative problem-solving approach (Pirsig’s Romantic Knowledge).

Ramsden (1992) argues that good teaching and learning arise from what people (lecturers and students) do and how they think about what they are doing. He focusses on quality teaching and learning and argues that good teaching promotes good learning for students and that makes it more enjoyable as an end in itself for teachers and students. Good teaching is also a means towards the end of development and growth of students. He makes the point that teaching is not only about covering content but also about the processes of teaching and learning. For example, Ramsden quotes a teacher,

“What I’m doing now is not thinking so much about the material...but how...to split

this up and work out the groups. How I'm going to structure the movement from two to six groups or a plenary... Once they are off, the session will be pretty much over.”  
(p. 14)

Some universities have accepted the importance of teaching and use the term “scholarship in teaching” as a criterion for promotion. Some misunderstand this term and think it refers to keeping abreast of the literature in their field. The term means understanding that teaching is not only about content but also process and taking action by, for example, attending a staff development workshop on aspects of teaching.

Ramsden also explores surface and deep learning where the concepts have emerged from empirical research on how students approach learning in Sweden, Hong Kong, Britain, Australia and elsewhere. Some students adopting the surface approach to learning believe that they have to reproduce what the teacher does by writing down what the lecturer says and also by copying down everything he places on the Over Head Projector (OHP). Students may complain on course evaluation questionnaires if the lecturer does not leave items on the OHP long enough to be copied down.

Research is investigating why some students adopt a surface approach in one subject and a deep approach in another. Lecturers can influence how students will approach the material through what they say and do. Students will adopt surface approaches in courses where: (1) students' responsibilities are not clear, (2) learning goals are not stated, (3) assessment is extensive and its relation to course content and learning goals is not stated, and (4) there is no plan of procedure in a syllabus or reading list. Students will adopt deep approaches to learning where there is an aim at *meaning*. In interviews where students describe their own thoughts and work, students talk of making comparisons between the ideas, arguments, or evidence in different courses and within different parts of the same course, searching for similarities and differences. When a lecture dismisses these as irrelevant to the syllabus it discourages deep learning. They say that a lecturer who discourages dialogue when and where it is possible or fails to consider ways to develop it within existing constraints will discourage students with a deep approach. One problem is that some lecturers with good intentions of encouraging the deep approach fail because they do not provide the right processes for learning.

Ramsden (1998) deals with leading a Department in Australia during a time when, like in the UK, Australian universities are facing much change. Ramsden tells us that leadership can be learned and rewards in terms of research, teaching, and staff's ability to cope with change are worth the effort of learning to lead. Ramsden's book is directed towards Heads of Department and he sees them as “the critical coupling between conventional academic culture and the needs of the innovative university.” (p. 306). He includes a mix of theoretical and practical issues and checklists of suggestions and approaches from other academics' experiences. He provides theoretical background to his assumptions and an analysis of the factions changing higher education and the contradiction between mass education and elite values. He provides practical advice to help

academic staff enhance their academic effectiveness and to manage their performance. He looks at the needs of leaders and provides practical suggestions for reflecting on and developing one's leadership capacity. He concludes by examining what role universities should play in developing leaders for higher education. Ramsden says that universities could do more to nurture leadership skills.

Ramsden believes that leadership can be learned and that ongoing learning is important for any organisation. He believes effective academic leadership improves academic performance and contributes to the well being of staff. He establishes the importance of leadership of Heads: "just as teachers are a primary constituent of the academic context for students, so academic leaders are a key part of the academic environment for lecturers" (p. 66). He believes that academic leadership uses the same theories, approaches and skills as does academic teaching: in both cases the goal is similar knowledgeable, competent and thinking people, and the methods one chooses to lead or to teach will have an impact on one's success as a leader or teacher.

Ramsden makes the point that while business processes dealing with finances and human resources may be transferable from business to higher education, universities have not yet managed to create a model of leadership that recognises the difference between universities and other organisations.

Derek Rowntree is Professor of Educational Development and director of the Postgraduate Programme in Open and Distance Education at the Institute of Educational Technology in the Open University, England. Rowntree (1992) suggests that there are many interpretations of open learning but that the most widely agreed beliefs are about opening up learning opportunities to a wider range of people and enabling them to learn more congenially and productively. This involves reducing barriers to access and giving learners more control over their own learning. He argues that there are substantial benefits for learners involved in open learning but that there are different degrees of openness.

Rowntree (1997) coined the term *Materials-Based Learning (MBL)* to cover all of that wide range of learning methods where learners depend on materials and less on face-to-face teaching than they do in other types of learning system. Examples are: open learning, distance learning, flexible learning, independent learning, supported self-study, self-management learning, computer-assisted learning, technology-based learning, distributed teaching and resource-based learning. MBL systems sound like a good idea but they don't always work or at least not as well as expected. Teaching staff may be suspicious of these new methods and it may cost more than expected and other institutions may criticize these teaching methods. Rowntree picks out over 100 potential success factors to overcome these difficulties and make MBL work. The factors are interrelated since few can be considered in isolation from at least some of the others. There are three major aspects of setting up and running an MBL system and success factors can be listed under each category: (1) setting up and managing an MBL programme or system (e.g. access, aims, contacts), (2) providing a learner support system (e.g. cheating, face-to-face sessions, record-keeping) and

(3) designing courses and learning materials (e.g. activities, assessment, internet, media).

Rowland (1993) focussed on the role of the tutor in education. He points to the difference in behaviour between a tutor who is didactic and one who is enquiring. The enquiring tutor concerns himself with reflection and negotiation and asks questions like, “how are the students feeling about this?” “how does the student understand this?” “why do these students feel differently from each other?” Enquiry is something which is central to teaching and not an addition to it. However, with the didactic approach the tutor is more concerned with objectives being met.

### 2.2.3 Academic managers

Triggle (1998), Dean of the Graduate School, SUNY Buffalo, USA, starts off by pointing out that universities are growing and prospering but that they are changing, where the students are no longer monks and the faculty are no longer priests and the curriculum no longer Greek, Latin, logic, rhetoric and philosophy as it was in the 18th century. He notes that unlike Newman’s original dream of universities pursuing knowledge for its own sake, they now celebrate knowledge as producers of useful knowledge, where they are expected to be components or driving forces of economic engines! He says that the changes are causing great discomfort and bringing us away from Newman’s original dream and that this change has been happening for centuries. He says, “I will argue that change is constantly occurring in universities, but that we, the faculty, looking through the retrospectroscope are too often trying to escape the reality of change by focussing on what was, rather than the imperatives of what must be.” He says that changes in universities are in a rapid state of flux and spurred on by several factors: (1) rapid changes in learning technologies, (2) increased demand - demographics and economic market, (3) increased general competition, (4) new learning organisations - virtual universities, (5) proprietary competition - corporations buying or starting universities, (6) market segmentation, (7) rapidly growing rate for education, (8) education as a commodity and (9) funding limitations. He says, “These objects, and in particular the new technologies, increased demand for life-long learning and funding constraints are going to rapidly change the face of higher education. These changes will not always be easy nor will they always be well received by the faculty.”

He goes on to discuss the death of guilds which are social groups, institutions created by groups of workers, around their work skill or craft. A model for a guild has four basic components: association, workplace, market and relation to state. At the time of formation guilds ran counter to the feudal system where the critical dimension was power of association - an association of equals is the key to self-organization and self-governance. The way of governance is ascending rather than the feudal descending order. He says, “I will argue that in the contemporary *average* (his italics) US universities the professoriate has increasingly limited guild power. True in some universities some professors of “star quality” play the market and win on terms that they set. But the rest of the profession trades a form of job security - tenure - itself increasingly challenged for deteriorating work conditions and a stagnant salary scale.” He points out that freedom and low

cost of information now due to rapid developments in computing power and communications is a precipitating change. There are needs for greater levels of education and also life-long learning where people need to be reeducated with new skills not just once, but several times.

He goes on to discuss the fact that universities should look at non-linear ways of integrating science and technology and where there is more interdisciplinary work rather than the linear model of compartmentalising ‘pure’ and ‘applied’ research and ‘technology’. He says, “This suggests that we need to rethink the universality of the linear model and replace it with a more complex one in which science and technology are more intimately linked.” He refers to Michael Gibbons, a former director of the Science Policy unit at the University of Sussex, England, who argues that science is not about putting bricks on top of each other but more about solving complex problems that cross many disciplines and the university in an environment called “a socially distributed knowledge-production system”. Triggles cites the example of Microsoft spending \$80 million to establish an endowed laboratory at Cambridge University, England.

Triggles has noted that universities are more like businesses, and academics more like businessmen, where much of their focus is on the use of knowledge which has become more important than the pursuit of knowledge itself, all of which would make Newman turn in his grave. His focus on the integration of science and technology goes back to Newman’s thinking on knowledge as a whole but also Kjærdsdam and Enemark’s ideas on what education should be. Triggles’s ideas have much in common with Feynman and Schank.

Denis Faul, Paul Clifford, Paul Cannon, and Sean Barrett have written Letters to the Irish Times newspaper (see Appendix A) in reaction to the controversial restructuring plan for The Queen’s University of Belfast, Northern Ireland by Prof. George Bain, its new Vice Chancellor (President/Rektor). 107 academic staff have been targeted for early retirement based on expected contribution to the Research Assessment Exercise (RAE 2001). Barrett says,

“...Taylor’s research mercenaries will have very large salaries. Shorn of its outdated managerialist jargon, the exercise is the means by which a very small number of university staff award themselves very large salaries at the expense of their colleagues and taxpayers. Such high earners could not possibly be expected to mingle with students. They will leave undergraduate teaching to junior staff.

Some university staff hope to become very wealthy from the UK system. The majority, I believe, loathe it. They do not speak out, as Dr Reville requests, because the managerial university is a controlled society which punishes dissidents. The loss of the university as a liberal voice in society and the dumbing down of undergraduate teaching are among the many costs of the UK system which are not considered by the beancounters...”

Barrett gets at the crux of what has happened to Universities in the UK, where managers are more important than educators and where the use of knowledge has become more important than knowledge itself. The end result is that education itself is left in a state of “dumbing down”.

Roger G. H. Downer, the new President (Vice Chancellor/Rektor) of the University of Limerick, Ireland at his inaugural address (see Appendix A) on September 15th, 1998 says that a university should be like a village pub intellectually. He says,

“Rather than an elitist and remote ivory tower, I would like the university to serve as an intellectual equivalent of the village pub. A place where people gather to discuss and explore ideas, discover new truths and insights and from which new and creative ideas flow out into the community to enrich and enhance the world in which we live.”

Downer’s point is a good one and in concordance with Newman, Stevenson, Pirsig, Feynman, Schank, Kjærdsdam and Enemark, Ramsden, Rowland and Trigg he believes that a university is about dialogue and where results of that dialogue can enrich our world.

#### 2.2.4 Popular scientists

Horgan (1996) interviews a number of thinkers and scientists such as Noam Chomsky, Daniel Dennett, Stephen J. Gould, Stephen Hawking, Roger Penrose, Karl Popper and John Wheeler and proposes that science is coming to an end that all we need to do now is engineering. He makes a strong case that the best and most exciting scientific discoveries are behind us. He says that many scientists today (1996) are “gripped by a profound unease” due partially to dwindling financial resources and vicious competition but also due to the sense that “the great era of scientific discovery is over”. Horgan’s points are useful because they show that knowledge and discovery is a function of time which is the central theme of Kuhn’s (1962) paradigm-shifts, although Horgan is talking less about intra-field shifts and more about inter-field shifts (Science → Engineering). But, I wonder is this lack of Science due to too much focus on Classic Knowledge in the education system and not enough on Romantic Knowledge?

Goleman (1996), in his book on *Emotional Intelligence*, argues that IQ is not destiny and that our view of intelligence is far too narrow. He says our emotions play a far greater role in thought, decision making, and individual success than is commonly acknowledged. What Goleman means by emotional intelligence is self-awareness and impulse control, persistence, zeal and motivation empathy and social deftness. He says that these are the qualities that mark people who excel, whose relationships flourish and who are stars in the workplace. He shows how emotional intelligence can be nurtured and strengthened in all of us and points out that emotional lessons learned by children sculpt the brain’s circuitry. He provides detailed guidance as to how parents and schools can benefit from this. I believe that Goleman has touched on something here which has been lacking in traditional education for years. We have relied on boring measurements like IQ whilst we all knew that there are many other factors involved in one’s success in the real-world social environment.

Goleman points to two brains/minds or types of intelligence: (1) rational and (2) emotional and that we need a balance of both. These relate to Pirsig’s Classic/Romantic Knowledge distinction.

He notes that Erasmus wanted to replace feeling with reason. Goleman relates a story where Jason H., a sophomore and straight-A (grade) student at Coral Springs, Florida, highschool stabbed David Pologruto, his physics teacher with a kitchen knife for giving him a grade B on a quiz. Goleman says,

“The question is, how could someone of such obvious intelligence do something so irrational – so downright dumb? The answer: Academic intelligence has little to do with emotional life. The brightest among us can founder on the shoals of unbridled passions and unruly impulses; people with high IQs can be stunningly poor pilots of their private lives.” (p. 33)

He notes that one of Psychology’s open secrets is the inability of IQ or SAT scores to predict unerringly who will succeed in life. He says that at best IQ contributes about 20% to the factors that determine life success and that leaves 80% to other forces. Goleman gets at the nub of the fact that society fools itself into thinking intelligence can be measured in traditional intelligence tests, whereas in actual fact intelligence is a much more complex phenomenon and contains much which cannot be easily tested.

Cole (1998) brings mathematics to laypeople, and without the use of equations, she shows how mathematics applies in many different fields in the real world. She explores galaxies, voting systems, the risks of smoking, the usefulness of DNA matches in criminal investigations, and creatures that live on our eyelashes. Einstein said “Pure mathematics is, in its way, the poetry of logical ideas.” Cole surveys mathematical concepts which she groups into four parts: (1) “where mind meets math”: unreality of large numbers and human propensity to interpret risk in all the wrong ways, (2) “Interpreting the physical world”: measurement and scale, (3) “Interpreting the social world”: the social world, and (4) “the mathematics of truth”: truth, probability and logic. She has a special focus in (4) on Emily Noether, the German mathematician whose proof that the laws of conservation in physics are equivalent to the laws of symmetry solved questions about Einstein’s 4D space-time. She says,

“What I personally like best is the way that truth and beauty come together in the work of Emmy Noether and Albert Einstein: How deep truths can be defined as invariants — things that do not change no matter what: how invariants are defined by symmetries, which in turn define which properties of nature are conserved, no matter what. These are the selfsame symmetries that appeal to the senses in art and music and natural forms like snowflakes and galaxies. The fundamental truths are based on symmetry, and there’s a deep kind of beauty in that.”

She produces an attack on the book, *The Bell Curve* by Charles Murray of the American Enterprise Institute and Richard Herrnstein of Harvard. The book wheeled out an arsenal of mathematical artillery to show that intelligence is mostly inherited and that blacks have less of it. Reviewers and readers admitted to shell shock when faced with statistics, graphs and multiple-

regression analyses. However, those who looked deeper into the statistics found that the numbers swept critical qualifications under the carpet rendering much of the mathematics meaningless – i.e., what statistics say in general says nothing about individuals. The whole point of Cole’s book is to bring mathematics to everyone but also to show that Mr. Worldly Wiseman can get things wrong, especially with slippery items like statistics.

## 2.3 IntelliMedia 2000+

The area of MultiMedia is growing rapidly internationally and it is clear that it has various meanings from various points of view. MultiMedia can be separated into at least two areas: (1) (traditional) MultiMedia and (2) Intelligent MultiMedia (IntelliMedia). The former is the one that people usually think of as being MultiMedia, encompassing the display of text, voice, sound and video/graphics with possibly touch and virtual reality linked in. However, here the computer has little or no understanding of the meaning of what it is presenting.

IntelliMedia, which involves the computer processing and understanding of perceptual signal and symbol input from at least speech, text and visual images, and then reacting to it, is much more complex and involves signal and symbol processing techniques from not just engineering and computer science but also artificial intelligence and cognitive science (Mc Kevitt 1994, 1995/96, 1997c). This is the newest area of MultiMedia research, and has seen an upsurge lately, although one where most universities do not have all the necessary expertise locally. With IntelliMedia systems, people can interact in spoken dialogues with machines, querying about what is being presented and even their gestures and body language can be interpreted.

Although there has been much success in developing theories, models and systems in the areas of Natural Language Processing (NLP) and Vision Processing (VP) (Partridge 1991, Rich and Knight 1991) there has been little progress in integrating these two subareas of Artificial Intelligence (AI). In the beginning although the general aim of the field was to build integrated language and vision systems, few were, and these two subfields quickly arose. It is not clear why there has not already been much activity in integrating NLP and VP. Is it because of the long-time reductionist trend in science up until the recent emphasis on chaos theory, non-linear systems, and emergent behaviour? Or, is it because the people who have tended to work on NLP tend to be in other Departments, or of a different ilk, from those who have worked on VP? Dennett (1991, p. 57-58) says “Surely a major source of the widespread skepticism about “machine understanding” of natural language is that such systems almost never avail themselves of anything like a visual workspace in which to parse or analyze the input. If they did, the sense that they were actually understanding what they processed would be greatly heightened (whether or not it would still be, as some insist, an illusion). As it is, if a computer says, “I see what you mean” in response to input, there is a strong temptation to dismiss the assertion as an obvious fraud.”

The Institute for Electronic Systems at Aalborg University, Denmark has expertise in the

area of IntelliMedia and has already established an initiative on Multimodal and Multimedia User Interfaces (MMUI) called IntelliMedia 2000+ by the Faculty of Engineering and Science. IntelliMedia 2000+ coordinates research on the production of a number of real-time demonstrators exhibiting examples of IntelliMedia applications, established a new Master's degree in IntelliMedia (see Mc Kevitt 1997b), and coordinates a nation-wide MultiMedia Network (MMN) concerned with technology transfer to industry. IntelliMedia 2000+ is coordinated from the Center for PersonKommunikation (CPK) which has a wealth of experience and expertise in spoken language processing, one of the central components of IntelliMedia, but also radio communications which would be useful for mobile applications (CPK Annual Report 1998). More details on IntelliMedia 2000+ can be found on <http://www.cpk.auc.dk/imm> and Mc Kevitt and Dalsgaard (1996).

IntelliMedia 2000+ involves four research groups from three Departments within the Institute for Electronic Systems: Computer Science (CS), Medical Informatics (MI), Laboratory of Image Analysis (LIA) and Center for PersonKommunikation (CPK), focusing on platforms for integration and learning, expert systems and decision taking, image/vision processing, and spoken language processing/sound localisation respectively. The first two groups provide a strong basis for methods of integrating semantics and conducting learning and decision taking while the latter groups focus on the two main input/output components of IntelliMedia, vision and speech/sound.

### 2.3.1 Education

Teaching is a large part of IntelliMedia 2000+ and two new courses have been initiated: (1) *MultiModal Human Computer Interaction*, and (2) *Readings in Intelligent MultiMedia*. MultiModal HCI, including traditional HCI, involves teaching of methods for the development of optimal interfaces through methods for layout of buttons, menus, and form filling methods for screens but also includes advanced interfaces using spoken dialogue and gesture. The course on Readings in Intelligent MultiMedia is innovative and new and includes active learning where student groups present state of the art research papers and invited guest lecturers present their research from IntelliMedia 2000+. A new Master's Degree (M.Eng./M.Sc.) has been established and incorporates the courses just mentioned as core modules of a 1 and 1/2 year course taught in English on IntelliMedia. More details can be found on <http://www.kom.auc.dk/ESN/masters>. Occasionally, a Lifelong Learning course is given for returning students of Aalborg University who wish to continue their education. This course is a compression of the core IntelliMedia courses.

The emphasis on group organised and project oriented education at Aalborg University (Kjærsgaard and Enemark 1994) is an excellent framework in which IntelliMedia, an inherently interdisciplinary subject, can be taught. Groups can even design and implement a smaller part of a system which has been agreed upon between a number of groups. It is intended that there be a tight link between the education and research aspects of IntelliMedia 2000+ and that students can avail of software demonstrators and platforms developed but can also become involved in developing them. A number of student projects related to IntelliMedia 2000+ have already been completed

(Bakman et al. 1997a, 1997b, Nielsen 1997, Tuns and Nielsen 1998) and currently 19 students organised as eight student groups have graduated with their Master's having conducting projects on for example, intelligent internet browser, hitch hiker's guide to the galaxy, emotional agents, 3D desktop environment, interactive storytelling, multimodal interfaces, billard game trainer, multimedia applications on mobile phones, whilst a new intake of another 20 students are beginning their second semester and another 73 have applied for the year 2000 intake.

### 2.3.2 Research

The four research groups of IntelliMedia 2000+ have developed the first prototype of a general suite of tools in the form of a software and hardware platform called *CHAMELEON* that can be tailored to conducting IntelliMedia in various application domains. CHAMELEON demonstrates that existing software modules for (1) distributed processing and learning, (2) decision taking, (3) image processing, and (4) spoken dialogue processing can be interfaced to a single platform and act as communicating agent modules within it. CHAMELEON is independent of any particular application domain and the various modules can be distributed over different machines. CHAMELEON has an open distributed processing architecture and currently includes ten agent modules: blackboard, dialogue manager, domain model, gesture recogniser, laser system, microphone array, speech recogniser, speech synthesiser, natural language processor, and a distributed Topsy learner (see Figure 2.1).

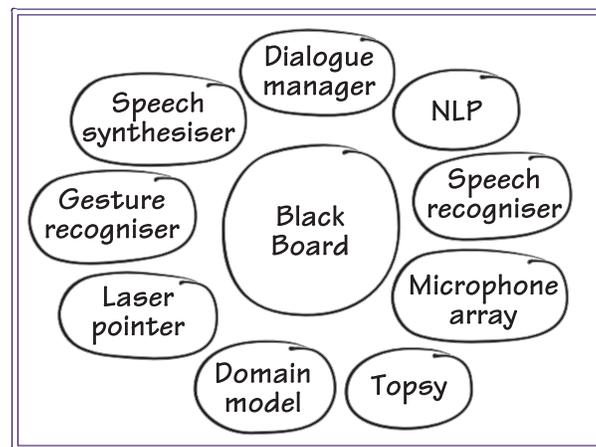


Figure 2.1: Architecture of CHAMELEON

Most of the modules are programmed in C and C++ and are glued together using the DACS communications system. In effect, the blackboard, dialogue manager and DACS form the kernel of CHAMELEON. Modules can communicate with each other and the blackboard which keeps a record of interactions over time via semantic representations in frames. Inputs to CHAMELEON can include synchronised spoken dialogue and images and outputs include synchronised laser

pointing and spoken dialogue.

An initial prototype application of CHAMELEON is an *IntelliMedia WorkBench* (see Figure 2.2) where a user will be able to ask for information about things (e.g. 2D/3D models, pictures, objects, gadgets, people, or whatever) on a physical table. The current domain is a *Campus Information System* for 2D building plans which provides information about tenants, rooms and routes and can answer questions like “Whose office is this?” and “Show me the route from Paul Mc Kevitt’s office to Paul Dalsgaard’s office.” in real time (see Figure 2.3).

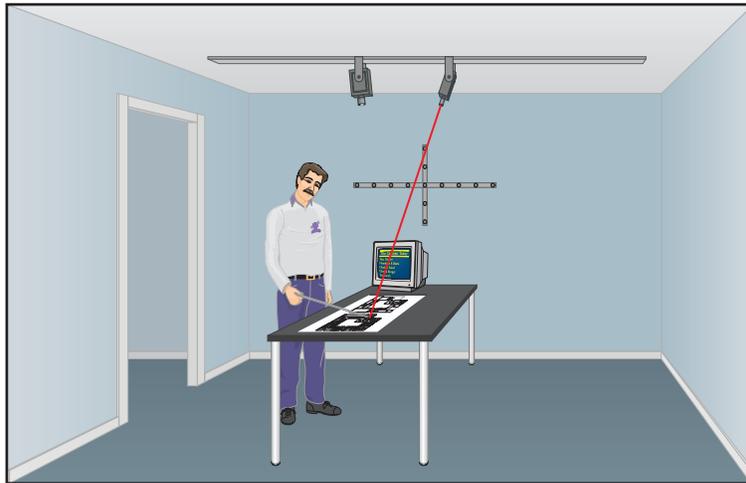


Figure 2.2: Physical layout of the IntelliMedia WorkBench

CHAMELEON demonstrates that (1) it is possible for agent modules to receive inputs particularly in the form of images and spoken dialogue and respond with required outputs, (2) individual agent modules can produce output in the form of semantic representations, (3) the semantic representations can be used for effective communication of information between different modules, and (4) various means of synchronising the communication between modules can be tested to produce optimal results. CHAMELEON and the IntelliMedia WorkBench are ideal for testing integrated signal and symbol processing of language and vision for the future of SuperinformationhighwayS. More details on CHAMELEON can be found on <http://www.cpk.auc.dk/imm> and Brøndsted et al. 1998a,b,c).

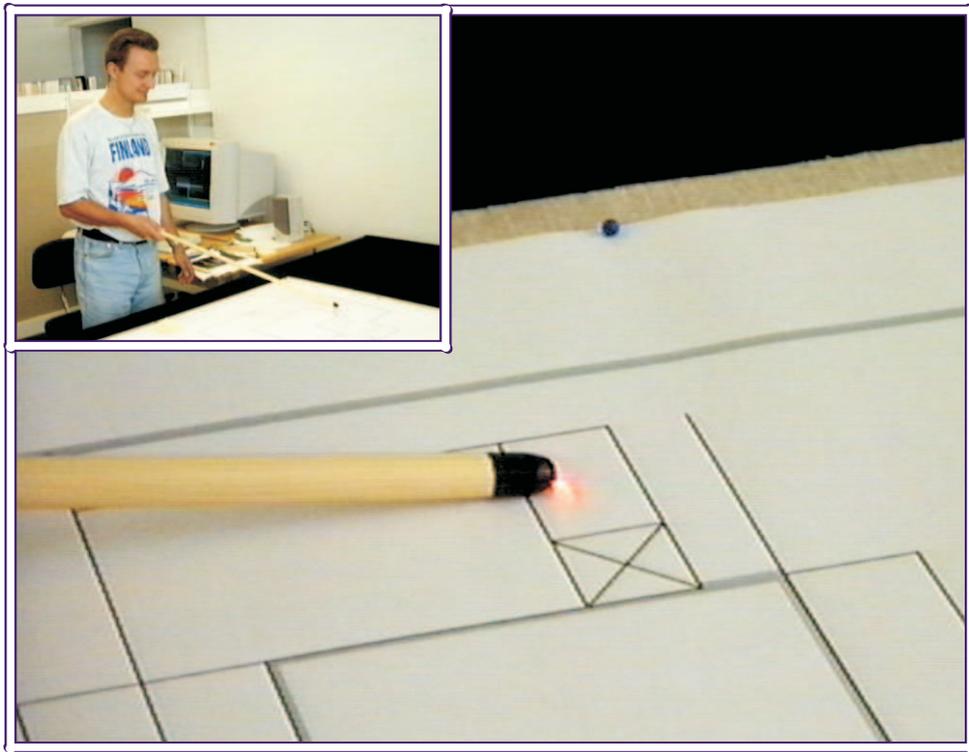


Figure 2.3: Physical table

# Chapter 3

## Ideas for universities

### 3.1 Classic education

It seems to me that too much education in general, but also university education, has been about students learning facts and being able to regurgitate them. There has been little room for thinking or creativity because most of the student's time is taken up with remembering facts for examinations. This style of education suits systems which wish to control people because when they think too much people can become unruly. Borrowing from Pirsig, I characterise this style of education focussing on Classic Knowledge as *Classic*. The key components of Classic education are the *message* and the *messenger* which are reinforced through classic assessment.

#### 3.1.1 The message

One of the pinnacles of Classic education is the learning of “known” facts, or the *message*. So, at school we are all taught that the Earth is round, Newton's laws, the different types of numbering system, proper grammars, which countries are “developed” and which are “underdeveloped” and so on. At University we are taught even more detailed messages which are to be remembered and repeated in examinations. In fact, most universities have competitive systems where students are to compete for the highest grades through remembering messages which will imply they will get better job offers, have a higher standing in society, etc.

I wish to argue here that the traditional massing of messages and regurgitation *alone* is bad because it stifles thinking and creativity. If one is spending one's time amassing knowledge all the time, then where is there time to think? or to create new ideas? I am not saying that the massing of messages per se is bad, and in fact it is necessary, otherwise one would not know if an idea is a new one or not! However, what I am saying is that if it takes up too much time and takes time away from thinking and creativity, then it is bad!

### 3.1.2 The messenger

Another pinnacle of Classic education is the communicator of the message, the teacher or lecturer, the *messenger*. Usually the messenger is considered to know the facts which have to be handed down to the student. The process of education is one where the messenger preaches for an hour or so at intervals and the students typically copy the message down. There is little or no dialogue between the messenger and the student and the student is required to regurgitate the message in examinations. The style of interaction between the messenger and the student is monologue.

I wish to argue that traditional lecturing (monologue) *alone* is bad because it also stifles thinking and creativity. If one is spending all of one's time listening to facts then one has little time to think or create new ideas. I am not saying that monologue per se is bad and in fact it is not even clear that it is necessary since students can read the message in books or get it from the internet — hence, the messenger has another function and that is to select which messages are relevant. The messenger is also meant to *explain* the message, although at many universities it is well known that this is rarely done or done well.

### 3.1.3 Classic assessment

Traditional assessment usually consists of individual sit-down written examinations. Usually an examination is conducted where a student sits down in the examinations room and performs a written examination in order to regurgitate the message. Again, there is little or no dialogue during this process. Classic assessment is used to reinforce (1) the message and (2) the messenger.

I wish to argue that traditional sit-down written examinations alone are bad and serve to prop up Classic education which stifles thinking and creativity.

To sum up, Classic education emphasizes remembering and regurgitation of the message from the messenger and is reinforced through Classic assessment and the whole process, if taken on its own, stifles creativity, thinking and learning.

## 3.2 Romantic education

There is a style of education which is different to Classic education and focusses more on groupwork, active learning, solving problems, thinking and creativity. Also, the means of assessment which is more egalitarian and less competitive, reinforces this approach to education. This style of education suits systems which are not afraid of new ideas and creativity. It is something which I thought did not exist until I discovered the USA liberal arts colleges<sup>1</sup>, the Sheffield M.Ed. course and Aalborg University, Denmark. Again, borrowing from Pirsig, I classify this style of education focussing on Romantic Knowledge as *Romantic*. The key components of Romantic

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<sup>1</sup>I first encountered these through reading about St. John's College, Santa Fe, New Mexico, US (see <http://www.SJCSF.EDU/>).

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education are *groupwork* and *active learning* which are reinforced through romantic assessment. Integrating research and teaching and interdisciplinary studies provide suitable context which acts as a catalyst.

### 3.2.1 The group

Groupwork is invaluable in that it reflects how many projects are completed in the real world. Also, the strengths and weaknesses of members of the group can be matched so that each one can contribute as much as possible. The group is usually heavily involved in dialogue rather than monologue. For groups to be successful it is of course important that the members get along well together and can cooperate with each other. One disadvantage of groupwork is that lazy people may be able to hide in the group, but this can be teased out during assessment. Groupwork is a key component of Romantic education.

As described in the previous chapter, Aalborg University, Denmark has a style of education based on groupwork where all projects are conducted in groups. The group works together and it is up to them to decide how the project will be solved. The Sheffield M.Ed. course was also organised in the form of group discussions and although it was not often that projects were carried out in groups the group discussion of ideas was very useful.

### 3.2.2 Active learning

Active learning is important in that students should want to learn rather than being pushed into doing so and hence students should take an active part in their own learning. Active learning also encourages dialogue rather than monologue since students are not passive receivers of a message but they must determine the message themselves. Active learning can be found in many forms and one example is project-based education where knowledge is not seen as an end in itself, but as a means towards which problems can be solved. I argue here that this style of learning is good because it stimulates the students to think and to create. Active learning is a key component of Romantic education.

As mentioned in the previous chapter, Aalborg University, Denmark is one where over 50% of courses for all degrees are project-related and are assessed through projects. The project work drives the thirst for knowledge and not vice-versa, i.e. the students are motivated to learn to solve their problems. Also, there is more interaction where the messenger visits the students in their group rooms and helps them with problems they have to solve. In the Sheffield M.Ed. much of our work involved active learning where much of the time we as students directed the discussions as much as the tutor.

### 3.2.3 Romantic assessment

Non-traditional assessment can take many forms but one example is to put emphasis on oral examinations where there is a dialogue between messenger(s) and student(s). There is a lot more opportunity to discover exactly what the student does and does not know but also what the messenger does and does not know. Another form of assessment might involve the writing up of personal thoughts and views on materials read about and debated (e.g. the M.Ed. module portfolios). Romantic assessment reinforces groupwork, active learning, interdisciplinary studies and stimulates thinking and creativity, i.e. encourages Romantic education.

Aalborg University student group projects are evaluated through a 3 hour oral examination where the examiners intensively examine the students through question and answer sessions. The Sheffield M.Ed. module portfolios were assessed through the evaluation of written reports on material read about and debated and it was left very open as to the form the portfolio took.

### 3.2.4 Integrating teaching and research

I firmly believe that the integration of teaching and research provides an important context for stimulating thinking and creativity and hence Romantic education. The students benefit from seeing the latest research in the field and also the messenger benefits from obtaining an ever better understanding of his work by presenting it to the students.

Also, by presenting his own research the messenger will be more open to dialogue about it and not feel he's just presenting some detailed facts which he's not interested in. The messenger will be more open to potential dialogues with students about the research.

### 3.2.5 Interdisciplinary studies

Interdisciplinary studies provide another important context for Romantic education because again they encourage thinking and creativity and enable students to come up with new links between subjects and new ideas. Classic education will try to stifle interdisciplinary studies since things can become too complex, unwieldy and out of control. Also, the message becomes less clear when we are looking at the blurred borders between subjects and then it is more difficult to assess.

## 3.3 Idea

An idea for universities is a balanced tradeoff between Classic and Romantic education where both come into play. Of course, it is important to know and remember the message but not to spend all of one's time doing so, and especially at the expense of dialogue, thinking and creativity. However, with the integration of Classic and Romantic education the message and messenger take on a whole new meaning because now sometimes the message is provided by the student and

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sometimes the student becomes the messenger. Also, the traditional messenger can become the object of assessment as much as the student.

In fact, Aalborg University, Denmark, as described in the previous chapter, has established an education system which is implementing this idea since it has integration of Classic and Romantic education. There are two types of courses, one Classic (basic study, SE courses) and the other Romantic (project-related, PE courses) with 50% of each type, i.e. the Aalborg system has an equal balance of Classic and Romantic education.

Hence, in a nutshell, an idea for universities is to incorporate the following central components of both Classic and Romantic education:

- *what* is the message?
- *who* is the messenger?
- Classic and Romantic assessment
- groupwork
- active learning
- integration of teaching and research
- interdisciplinary studies

Aalborg University, Denmark and the Sheffield M.Ed. course incorporate these components and implement this idea for universities.

## Chapter 4

# Implementing ideas

In the previous chapter I presented ideas for a university based on integration of Classic and Romantic education. Here, I wish to demonstrate how I have been implementing these ideas in my practice from the point of view of teaching, research and curriculum development. Also, I present two example projects of what I see as others implementing these ideas.

### 4.1 Teaching & Research

I have consistently implemented these ideas in my teaching and research practice for over three years now. This in respect of a course I teach at Aalborg University on *Readings in Intelligent MultiMedia* (see Appendix B) which I also taught at a European Summer School on Multimodality in Language and Speech Systems (MiLaSS), Stockholm, Sweden, July, 1999 (see Appendix B and <http://www.speech.kth.se/milass>). I am also implementing the ideas in project supervision and studytrips abroad.

#### 4.1.1 Readings in Intelligent MultiMedia

In Autumn 1996 this advanced readings course was offered to five different groups of students from both the Engineering and Computer Science Departments at Aalborg University, Denmark. I proposed an innovative and new method of teaching where student groups would present research papers and then the whole class would have a general discussion of them. The presentations would include four aspects: (1) who the group is and what their project is, (2) a summary and critical analysis of the papers, (3) how the papers relate to their project and (4) how do the papers and their project relate to IntelliMedia 2000+. Then, the whole class would discuss the readings and group presentation. I asked if one group member could write up minutes of our discussions for posterity. I also asked the students to do everything in English which is another challenge for them (most Danes speak and write English well though). The idea here is that this method does not only develop the students' presentation skills but also their ability to assimilate, analyse critically and

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use recent research in the field. I chose the papers from a selection of books which have just been published on the latest research. Another aspect of the course was that I invited a guest lecturer for each session to talk about their research interests. These guest lecturers were either working on IntelliMedia 2000+ or from the Humanities faculty working on problems such as MultiMedia and language processing issues related to IntelliMedia 2000+. This emphasis on interdisciplinary work, and especially links with the Humanities, was important for me since this is how I came to think about integrating language and vision processing in the first place (see Appendix C.1) and it has also become even more important since (see Appendix C.2).

When I had suggested this idea to the group in charge of the curriculum one Professor was very positive and said that they were open to new ideas with respect to education and he liked my idea. However, one of the more junior members of staff did not like the idea and said that it would turn the students off because they would have to do too much work. I disagreed! I asked another member of staff for advice and he mentioned that whether or not one should do such a readings course where the students have to become active is really up to oneself. He mentioned something about the fact that faculty members must mount up teaching hours and that they use these to *buy* research work time – I’m not quite sure if I understood the concept! The problem with readings type courses is that one cannot claim the same amount of hours as honestly as one could in a non-readings one because such courses involve students in active learning! This is an example of how social context affects innovation. I asked him if students would cooperate if I wished to do active learning, and could I force them to, and he said it is usually up to the will of the students. I met the students and they expressed that this was a new way to do things but they were prepared to cooperate if a little anxious. I told them they could come and see me at any time or E-mail me.

I knew that at Sheffield University Computer Science Department one of the Professors regularly conducts one of his third year undergraduate courses through student presentation of readings and the students do not mind and the course is a success. At Aalborg, I decided to do the same and this is in the environment of a university which already has an emphasis on Romantic as well as Classic education.

It turned out that the students, particularly the computer scientists, liked the class very much. The computer scientists got much more involved in the class with asking questions and doing their write ups of minutes on discussions. Maybe certain types of students are more suited to active learning than others? Certainly, engineering tends to be a much more clear cut subject with less room for questions and discussions! However, another factor which may have played a part is that of assessment. The course was of the type project-related (PE) for the engineering students, and hence was mainly examined through the end of semester oral examination on the project, whereas for the computer science students it was a free-study activity (optional extra course), which requires that a pass/fail grade is awarded. Hence, the computer science students had another motivation to perform better. During a discussion about the course organisation one

student asked me about assessment. He said “How will you assess the course?” and “Will you be happy to give a pass mark if we give a presentation?” and I said I would not be happy if people didn’t present. The assessment of the course was based on the students’ presentations, dialogue in class and minutes and the computer science students were assessed on a pass/fail basis. I passed all the computer science students.

In Autumn 1997 - 1999 I taught the course again and in 1998 the course was not offered to computer science students since computer science was commencing its own MultiMedia education. The class of ’98 had 19 students following the Master’s in Intelligent MultiMedia degree course which had by this time been established in full. This time the students were not just engineering students, but engineering students who had decided to specialise in Intelligent MultiMedia. Also, half of the students were foreign, some of them coming from Computer Science and other technical backgrounds, unlike in the previous years where most were Danish. Again, the students reported to the semester coordinator that they liked the course very much and especially its active-learning style. In ’98 one comment they made was that the course should be given in the earlier period in the semester (period-I<sup>1</sup>) since they would be able to use the content more in their projects at an earlier stage. The students also made this point to me in class and also mentioned it to the semester coordinator. I then did this in ’99! Formal student course evaluation sheets are given in Appendix B.2 for ’98. In ’98 and ’99 the engineering students performed much better than in ’96 - ’97 and I attribute this to the fact that they were now engineering students who had chosen to specialise in Intelligent MultiMedia. As in previous years the computer science students shone.

Something else very interesting happened in ’98. Only three students out of the 19 prepared written notes/minutes! This was despite the fact that I stressed the importance of notes/minutes many times in class and sent reminders on email. Going back to assessment I attribute this to the fact that none of these 19 students were being assessed on a pass/fail basis and this time there were no students from computer science at Aalborg University, who were being assessed, to live-up to! Also, there is the social context of the fact that all these students were taking the Master’s specialisation together and also most of them were in the same group room. I suspect that they decided en-masse to strike on the notion of doing minutes. One student who did minutes (see Appendix B.3) is one of my Master’s Thesis project supervisees, but also where he is the only member of his group. The other two students were working together in a group where I am not supervising their Thesis Project. However, in oral examinations at the end of the semester a tutor can remember who did their minutes, so there is no escape!

### 4.1.2 Research

In order to select a software demonstrator for IntelliMedia 2000+ a *Working Group* of six members was formed from the four research groups involved in the project and the group had extensive

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<sup>1</sup>Each semester is split into three periods with more to less teaching from period I to period III.

meetings and discussions in the form of groupwork. The results from the research groups of IntelliMedia 2000+ had hitherto to a large extent been developed within the groups themselves. However, our goal was to establish collaboration among the groups in order to integrate their results into developing IntelliMedia demonstrator systems and applications. Some of the results would be integrated within a short term perspective as some of the technologically based modules were already available, others on the longer term as new results become available. We set about deciding what our research demonstrator would be by formulating its requirements.

### Requirements

We formulated the following goals for the demonstrator:

- (1) to demonstrate the actual integration, however primitive, of speech and image modalities. This is the key goal of the project as a whole, and therefore, though of a much more limited/indicative character, of the demonstrator.
- (2) to demonstrate the social/political ability to combine our efforts across political and disciplinary boundaries.
- (3) to highlight necessary and/or interesting research issues and directions, i.e. the demonstrator is not an end in itself.
- (4) to produce useful/working technology - software & hardware - for the subsequent phases of the project, both for research and education where the technology would be general enough to be useful for a number of applications. The resultant platform would be available for postgraduate student projects.
- (5) to produce a working concrete demonstrator.

We also considered that the demonstrator application should maximise the following criteria: exploitation of local expertise, commercial potential, incremental achievement, internal collaboration, external collaboration, psychological appeal, and technological relevance. We decided it would not be a requirement that the demonstrator be “interesting” in its own right, or that it necessarily itself be the object of further development. On the other hand, it should touch as many of the topics/issues of interest to the participants as possible, and be extendible in the direction of greater generality or functionality should this be of interest.

The demonstrator would be a single platform called CHAMELEON with a general architecture of communicating agent modules processing inputs and outputs from different modalities and each of which could be tailored to a number of application domains. CHAMELEON would demonstrate that existing platforms for distributed processing, decision taking, image processing, and spoken dialogue processing could be interfaced to the single platform and act as communicating agent modules within it. CHAMELEON would be independent of any particular application domain.

### **Candidate applications**

In general, applications within IntelliMedia may conceptually be divided into a number of broad categories such as intelligent assistant applications, teaching, information browsers, database-access, command control and surveillance, and transaction services (banking). Examples of applications which may result within a short term perspective are enhanced reality (e.g. library guide), newspaper reader for blind/near-blind people, intelligent manuals, dedicated personal communicator (DPC), diagnosis systems (e.g. medical data processing) and mixed reality (e.g. surgery support systems).

Our next step was to choose an application for CHAMELEON. A number of candidate applications were selected and discussed during the course of a number of meetings. These were: processing sign language, apparatus repair, neuroanatomy system, bridge project, angiogram interpretation, CAD program, remote presence, and IntelliMedia VideoConferencing. These applications boiled down to the fact that the different agent modules within CHAMELEON could be applied initially in at least four areas: (1) spoken dialogue on visual scenes (e.g. apparatuses), (2) spoken medical reports (e.g. angiograms, neuroanatomy), (3) images from visual scenes (e.g. apparatuses) and (4) decision taking (e.g. neuroanatomy). The incorporation of the latter into a demonstrator would be new and innovative where most groups involved in IntelliMedia have not achieved or considered this.

We initially decided that the application would be IntelliMedia VideoConferencing but thought that the vision component would prove too difficult and also the spoken dialogue would be limited and difficult to separate from other dialogue in the application<sup>2</sup>. We had a rethink and finally decided on the following application which includes many concepts from the others.

### **IntelliMedia WorkBench**

An IntelliMedia WorkBench where things (e.g. 2D/3D models, pictures, objects, gadgets, people, or whatever) are placed on a physical table and the user can interact through the use of spoken dialogue and gestures. The system would respond with spoken dialogue and use a laser as a pointing device. An initial domain would be a Campus Information System providing information on 2D building plans.

This was the first time I had ever become so deeply involved in groupwork with respect to actually deciding what demonstrator would be chosen for a research project and I found it very tedious in the beginning. However, in hindsight I realised that by discussing the ideas and proposals thoroughly no stone was unturned and any avenue for potential failure had been explored. When we had decided which demonstrator was to be selected the implementation of it went extremely fast and much faster than I would have normally expected. I believe this was because with the

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<sup>2</sup>A simplified version of IntelliMedia VideoConferencing application has since been investigated in Bakman et al. (1997a).

strengths of each member of the group we had explored each possibility in detail and this had forced members of the working group to think things through.

### 4.1.3 Reading group

In order to augment the research and educational developments of IntelliMedia 2000+ I initiated a *reading group* where we discussed papers on state of the art research in the area at bi-weekly meetings. The format for the *reading group* was one where a given person would propose a paper or set of papers and host a meeting presenting a summary and where we would all discuss the papers. Minutes were then written up by the host based on the discussions and circulated to all present. I invited a number of academics from Humanities to host papers so that we did not only have a Science/Engineering bias. The reading group also served the purpose of bringing the research Working Group of IntelliMedia 2000+ up to speed on the state of the art.

### 4.1.4 Project supervision

Project-based learning is a large part of the education system at Aalborg University and I have supervised three projects as part of the Master's degree in IntelliMedia during 1998-1999. One project called "The Hitch Hiker's Guide to the Galaxy" focussed on developing a computer programme called h2g2 which would behave like the Hitch Hiker's Guide to the Galaxy and answer English questions in English. The domain of application was restaurants and pubs and h2g2 would answer questions like, "Where's the best place to get a pint of Guinness in Aalborg?" A neat addition was that h2g2 had different agents which would produce stories as answers to the questions and then based on the user's preferences for stories that agent's stories would be ranked higher each time. Another project called "Intelligent Internet Browser" focussed on developing a system which would monitor users' behaviour as they used an internet browser to search for information and then use that information to provide suggestions on further searches. Finally, the third project called "A 3D workspace for integration of collaborative agents" focussed on developing a toolkit which would enable users to develop 3D graphical interfaces with a high-level and simple specification language. The projects provided an excellent forum for integrating teaching and research and with the Aalborg style of education the students have to show how they incorporate ideas from project-based coursework into their projects. One way in which the students can feed back to research is demonstrated by the fact that the first project here and another project on emotional agents were presented by the students at a research conference on *Language, vision and music* (see Appendix C.2).

For assessment of these projects it was necessary to select two External Examiners. I chose two Full Professors, one an Engineer and the other a Computer Scientist. The grade for each project would be decided by all three of us. It was interesting to see that during the selection of the grades the engineer looked for qualities which he saw as good engineering whilst the computer scientist looked for qualities which he saw as good science. Also, the performance of the students on

questions in the oral examination was important. The computer scientist looked for the students' ability to answer questions around the topic of the thesis and asked them to think of new problems. He marked students up when they were able to deal with such questions well whereas he marked others down because they couldn't. Some of the students performed very well, and in fact the h2g2 group got the highest possible grade (13) mainly earned on their ability to solve new questions and problems whereas the others found it difficult to cope with questions outside the scope of their focussed project.

#### 4.1.5 Studytrip '99

At Aalborg University it is common for students to organise a studytrip abroad of approx. 1 week duration in their final semesters. The idea of the studytrip is to visit industry and other academic institutions and obtain a broader view of the state-of-the-art of how educations like theirs are being applied and conducted elsewhere. The students organise the trip themselves and they obtain sponsorship from the University and Danish industry.

In the Autumn of 1998 the Intelligent MultiMedia Master's students decided to organise such a studytrip and they asked me to help them decide which sites to visit. They were already interested in visiting Massachusetts Institute of Technology (MIT) Media Laboratory, Boston, USA and also Lucent Technologies' Bell Laboratories, New Jersey, USA both of which have a focus on Intelligent MultiMedia for some years now. Hence, it soon became clear that we would visit Boston and New York. Whilst developing an itinerary of sites to visit for this studytrip I attempted to obtain as wide a coverage of topics of, and approaches to, Intelligent MultiMedia as possible. I wanted to include companies as well as universities and focussed mainly on research laboratories since IntelliMedia is a new area and that is where much of it is found today. I also attempted to include work on speech, NLP (Natural Language Processing), and vision/graphics so that the basic input/output elements of IntelliMedia could be covered. Hence, I arrived at the following 10 sites: MIT Artificial Intelligence (AI) Lab., MIT Speech group, MIT Media Lab., Mitre corporation, BBN corporation, Harvard University (AI/NLP group), Lucent Technologies' Bell Labs. (Dialogue Systems), Rutgers University (CAIP, MultiModal systems), New York University (NLP group), and Columbia University (Graphics and MultiModal group). Coordination with most sites was straightforward although at some sites some researchers were away at other meetings but this cannot be helped when we were visiting all sites in one week. For the larger organisations, notably MIT Media Lab. it took some time to establish and unravel the structure of the organisation and who to talk to to arrange a visit.

Most sites gave memorable presentations and demonstrations. I was particularly impressed by the work at CAIP, Rutgers and the degree of funding and equipment that Prof. James Flanagan (formerly of Bell Labs.) has managed to attract there. Their very detailed scientific and engineering work on MultiModal systems and Human Computer Interaction (HCI), and in particular microphone arrays which they have developed and focussed much on over the years, was presented

well through a tour.

The presentation and demonstrations by Victor Zue of speech systems such as Jupiter (weather information) and Pegasus (flight information) at the MIT spoken language systems group were very impressive and also the follow-up meetings with Stephanie Seneff and their students. BBN corporation, and Lucent/Bell Labs. also presented impressive speech systems. Josh Bers at BBN demonstrated a handheld multimodal networked device with speech and pen input which gives information about vehicle diagrams and they demonstrated an on-line shopping dialogue system. The performance of these systems was impressive although it worried some that people would speak their authorisation password aloud. Lucent/Bell Labs. had a notable hands-free voice user interface (Woudenberg/Soong) with one fixed microphone where the speaker could move around the room whilst speaking to it. The system worked out the background noise and then suppressed it from what the speaker was saying. However, the system did not have the ability to handle situations where more than one speaker spoke at the same time. Also, impressive was their call centre answering application (Chu-Carroll) which they claimed performed better than people at answering and forwarding/routing calls. Their work on speech synthesis (Olive) handled not only English and German but also languages such as Spanish, French and Russian. And all this in the very labs. where Claude Shannon had developed information theory years earlier. On the way in we saw a large digital patent counter clocking up their patents to date and still counting.

Much of the NLP work we saw focussed on information extraction with Mitre and BBN focussing on Broadcast News (BNN - Broadcast News Navigator) and Columbia on hiring and firing in organisations. Many of these are taking part in the annual MUC (Message Understanding Conference) and TREC (Text REtrieval Contest) contests. Much of this work was relevant to some of our student projects on Intelligent Web Browsing and Mobile Intelligent Agent and HitchHikers guide based on web and other data. Columbia were conducting information extraction over medical data and then using that for a speech/graphics MultiModal generation system. We saw more theoretical NLP work at Harvard on modelling collaborative agents and their beliefs and intentions in various contexts.

With respect to graphics/vision Lucent's vision work on MPEG-4 face animation/talking heads (Petajan) and tennis-player tracking (LucentVision, Carlbom) were state of the art. The tennis-player tracking was demonstrated as being used by a TV sports presenter. Vision was incorporated into MultiModal interfaces of the gesture and narrative language group at the MIT Media Lab. Harvard demonstrated videos of lots of their graphics software for enabling optimal diagram layout and other applications.

Applications of IntelliMedia technology which were interesting were the robots (e.g. Cog and Kismet) of MIT AI Lab. and also the haptic interface tools there. At the AI Lab. we saw videos of many medical and other applications of IntelliMedia and AI technology. Also, of note was the Intelligent Room project headed by Michael Coen where computers see, hear and respond to human stimuli. And all this in the very AI Lab. where John McCarthy, who named the field "Artificial

Intelligence” in 1956 and invented timesharing and LISP, worked before going to Stanford and where Marvin Minsky (now moved to the Media Lab.) invented “frames” (1975)! Two projects of particular interest at the MIT Media Lab. were the interactive conversational agent REA (Real Estate Agent) of the gesture and narrative language group (Justine Cassell) and the GuideShoes project (Paul Nemirovsky and Glorianna Davenport) of the interactive cinema group. The former focusses on agents which one could interact with through speech and body and hand gestures (either bodysuit or vision). The latter focusses on the fact that aesthetic forms of expression (music, painting, video) can be used for information delivery and that, GuideShoes, a wearable system used to direct a user towards a specific geographic goal, uses music to navigate in an open space. Pengkai Pan of the same group presented a demo of picture sharing and personalised ordering of pictures.

To sum up, all the sites we visited presented research and demonstrations of applications which showed speech, NLP and vision processing either as independent or in integrated IntelliMedia systems. It was surprising to see that sometimes there was little collaboration between groups at a given institution, e.g. the Speech group, AI Lab. and Media Lab. at MIT do not seem to collaborate much at all and even within the Media Lab. there did not seem to be much collaboration between subgroups. It was unclear whether this was solely due to the competitive culture of the USA or maybe people and groups were too busy to even think about collaborating. Certainly, the various groups could gain a lot by collaboration, e.g. 1: we thought the emotional robot (Cog and Kismet) work at the MIT AI Lab. could gain from talking with the emotional work ongoing in the Affective Computing group at the MIT Media Lab. and vice-versa, e.g. 2: REA at MIT Media Lab. could gain from use of the MIT speech group’s speech technology.

It was interesting to see that many of the integrated systems, MIT AI Lab. (Intelligent Room), MIT speech group (Galaxy architecture), and MIT Media Lab. (Gesture and narrative language) used architectures (blackboard) and knowledge representations (frames) with contents (e.g. intentions) similar to those used in our own CHAMELEON (see <http://www.cpk.auc.dk/imm> and Brøndsted et al. 1998a,b,c) and they faced the same key problems: (1) synchronisation of inputs/outputs and their semantics, and (2) technical platform for integration. The sites also responded very positively to our presentation of CHAMELEON (with video) and overview of student projects with some in more detail and were impressed not only by the *unique Aalborg style* of education but also that we had a Master’s specialisation in IntelliMedia with 20 students approx. per year and also that the students could organise and obtain funding for such a studytrip and to even bring gifts! When Glorianna Davenport (MIT Media Lab.) asked, “How did you manage to get them all here???” I replied, “We came in a Longship, a Viking Longship!” A number of sites made employment offers, offers of potential student visits and at least one site said it would be interested in applications from the students for Ph.D. scholarships.

It it wasn’t for the excellent organisation of the students then I am sure this studytrip would not have been half as successful and I will always remember when Henrik mentioned “...joint

account...”, Mark Maybury (Mitre) gasping, “Wow, “joint account”, you guys are organised!”

Not only did I fully enjoy the 10 site visits but also the social events which go with such a trip and visits to the “JFK museum”, “Cheers”, Irish Pubs/Music, Boston Tea Party Old South Meeting House, and Holocaust/Great Famine memorials in Boston, the “Empire State”, “Statue of Liberty/Ellis Island”, Breakfast at Tiffany’s (“Sbarro”, 574 5th Avenue), and 3D video (“Across the sea of time”) at the Sony IMAX (Lincoln Centre) in New York, and “Hooters” (Boston & NY), are experiences that I can say were for me truly MultiModal.

This studytrip served as a perfect venue for integrating teaching and research. The students were able to get a feel for state-of-the-art-research at leading centres in the world but also to get comments and hints on their projects from these leaders. Also, they were able to see how what they had learned in their Master’s was relevant in working applications. Hence, they were able to place all their knowledge in context and see how it could be used further in solving real world problems.

#### 4.1.6 Summer school in MultiModality

Another forum which provides for integration of research and teaching is international summer schools. I have never had the luxury to goto a summer school but during late 1998 I was invited onto the Programme Committee and to teach at the Seventh European Language and Speech NETwork (ELSNET) Summer School on language and speech communication to focus on Multi-Modality in language and speech systems (see Appendix B.4). The target audience of the Summer School is advanced undergraduate students, Ph.D. students, postdocs and academic and industrial researchers and developers. My one week course at the summer school was mainly based on the *Readings in IntelliMedia* course described earlier. One aspect which was interesting was that I could report at the summer school on the student projects and this is a case of where teaching feeds back to teaching at research level. I believe that such summer schools provide an excellent forum where exchange of ideas can come from academics, research students, and industrialists.

## 4.2 Curriculum development

Here I discuss five projects in which I am participating and where I am implementing ideas for universities in my curriculum development practice. The projects are: (1) Aalborg University Master’s degree in Intelligent MultiMedia, (2) European Master’s Degree in language and speech (EU socrates CDA project), (3) Speech communication sciences (EU socrates TNP network) (4) Advanced computing in the Humanities (ACO\*HUM) (EU socrates TNP network) and (5) CompTrain: restructuring of the (re)training of school teachers in computer science (EU Tempus-Phare project).

### 4.2.1 Aalborg University Master's in Intelligent MultiMedia

As part of IntelliMedia 2000+ Aalborg University, Denmark decided to establish a Master's degree (M.Eng./Sc.) course in Intelligent MultiMedia.

A lady from the international office called a meeting and a number of faculty representatives from the Institute of Electronic Systems including myself attended. Her goal was to have established a number of Engineering Master's Degree educations which would accept foreign students to mirror those already offered for some time in the Humanities and Social Sciences Faculties at Aalborg University. We discussed for what period such a Master's would run and the Danes decided that it would not be possible to have a one year Master's Degree because foreign students would not be up to the same level as Danish students if they had finished a B.Sc. or B.Eng. from elsewhere. I was surprised at the automatic assumption that Danish students are better than foreign ones. Also, it was discussed that there would be problems with lecturers having to be trained better in how to teach in English and that many Danish students complained that they thought the standard of teaching went down when Danish lecturers taught in English. The lady from the international office pointed out that the Rektor (President/Vice Chancellor) of the University had made funds available for Danish lecturers to obtain training and practice in teaching through English. Also, any course at the university which involves foreign students is usually taught in English. I asked why the University wanted to attract foreign students (especially since students do not pay fees at the University so there would be no cash benefit) and the lady from the international office said that it was due to a general need for the University to internationalise in many ways and this was the trend of today's world.

A short proposal was made to the faculty by the curriculum representative and I helped him to make a case. The Faculty accepted the proposal and they formed a committee to design its content and advertise it. The committee included representatives from both Engineering and Computer Science.

I prepared a general description for this Master's degree and it was interesting in that curriculum development here was different to what I had experienced in the development for a Master's Degree at Sheffield University, England (see Mc Kevitt 1996a). At Aalborg I wasn't left to my own devices to formulate the content but a cross departmental committee directed this in a top-down manner. The format for the description was to produce a *Candidate Profile* and at first I did not understand what this meant. I thought it was something to do with entry requirements but it was a description of what a candidate would be qualified in after completion of the degree. This was the Danish equivalent for what we called *Aims and Objectives* in the Sheffield Masters. Another section was *Themes and Topics* and here I chose a set of themes and topics for each of three semesters which later turned out to span a set of courses which already existed in the departments. In fact, I was told not to mention specific courses from departments as the representatives might begin to fight over them. I drafted a description and showed it to the committee which they commented upon and then I redrafted it. This was then approved by the committee (see

Appendix D).

One interesting phenomenon which occurred during the meeting discussing my draft was that a representative from one department (Computer Science) wanted me to reduce the emphasis on themes to do with a certain topic (mobile phones and communication) because that biased the curriculum too much into a given department (Communication Technology). Also, he said he would like to see more Humanities courses in the curriculum but I had intentionally not put those in there because we had ruled Humanities out at a previous meeting (which he was not at!). Hence, I said that the Candidate Profile would have to be completely rewritten to which people sighed and then the Head of Department of Computer Science contradicted his colleague and said that we didn't need to include Humanities to which I replied: "I am confused now, are we including Humanities or not?!" to which everyone agreed that we would not include them in a major way but only a course or so from them.

The next step was to write up a detailed set of *Theme Descriptions* for each of the three semesters detailing the objectives, content and courses. I produced a draft and this was commented on by the committee and then I redrafted it. The main thrust of the comments were again that individuals wanted to see their favourite topics represented more. Also, a Computer Science representative liked to see shorter fatter objectives descriptions rather than longer thinner ones which are more common in Engineering. I had used previous theme descriptions from the Engineering Department as examples. There was a discussion about whether or not external examiners should be required for the course and also the cost that this entails. Aalborg University uses a 14 point scale (0-13) for grading and usually Engineering theme descriptions refer to this but it was pointed out that we should not refer to this on the Master's degree but that students would be graded on an internationally recognised scale. The theme descriptions have been passed on to the faculty in the form of a more formal detailed proposal. Next, we discussed specific courses which would be offered as part of the Master's and this involved course teachers producing descriptions of their courses in English and being asked to give their courses in English.

The head of the study board produced some brochures and posters and started advertising this Master's and potential applicants have expressed interest and asked for further information. There were some difficulties with development of brochures as different people from various Departments wanted their particular topic or subject emphasized. In 1997 whilst getting off the ground the Master's had 3 students, in 1998 and 1999 it had 19 and 20 students respectively, half of which are foreign and now 73 students have applied for year 2000 entry!

Another issue which surfaced during the development of the Master's curriculum was where Committee members frequently referred to the fact that foreign students are typically not qualified enough. This belief is carried through a number of channels and for example, appears in the introductory text for an internet-based course (see Appendix D.2). Here we have an instance of a web page for an internet-based course at Aalborg University which places a focus on the fact that foreign students do not have sufficient background. However, I would argue that it is just

as likely that Danish students might not have the sufficient background, for example if they come from a Computer Science rather than an Engineering background where it is likely they would not have training in these subjects. Hence I would argue that the use of “foreign students” here is unfounded, is based on the mistaken belief that somehow Aalborg University has a superior education with respect to content given, and would rather better be replaced by something more accurate and based on content like “non Engineering students”. Also, my experience has been that foreign students can be as qualified as the Danish ones. In fact, the highest grade possible (13), which is infrequently awarded, was awarded to a two-man group with one participant from England in this year’s set of graduates.

### **4.2.2 European Master’s Degree in language and speech**

In this EU Socrates Curriculum Development Action (CDA) network project (1997-2000) our goal is to develop the curriculum for a pan-european Master’s degree course in language and speech which will commence in October 1999. Our goal is to implement a 1 and 1/2 year Master’s where students will be required to spend at least three months at another institution in another European country. The idea is also that students will be able to avail of expertise at another institution which may not exist at their own. The project is detailed further in Bloothoof et al. (1998b, 1999) and on <http://www.cstr.ed.ac.uk/EuroMasters/>

There are currently 18 participant universities in the project and we have had five meetings at various participant sites. There were many difficulties on deciding what a good curriculum entails and how its contents would be described. Members were assigned to designing content descriptions for Master’s content and these were continuously developed over time. Usually more than one person was assigned as being responsible for a given content description and hence the content descriptions were the result of groupwork. It was agreed that groupwork and project-work would be a major part of the Master’s.

We decided there would be an Easter school of one week which all students would attend and take specialised courses to bring them up to standard on certain state-of-the-art topics. One proposed component of the Easter school which I did not like was that there could be standard individual sit-down written examinations which could determine if a student was up to standard; this idea seems to have subsequently disappeared, mainly, I think, due to difficulty of implementation.

There were many discussions about how courses at universities could be accredited to the European Master’s and how certification of students would be implemented and who would decide all of this? It was decided to involve ESCA (European Speech Communication Association) and the EACL (European chapter of the Association for Computational Linguistics) with respect to accreditation and certification. An accreditation agency would be appointed by ESCA and the EACL jointly and any university could apply for accreditation of their courses, although it was thought that accreditation in most cases would only make sense when the courses cover a substantial area of the Master’s. Initially, accreditation would be performed by the current project

participants subject to approval by ESCA and EACL. It was decided that the European Master's would be defined by content only and a student who completes courses that cover this content would be awarded a certificate by ESCA and EACL, signed by their presidents.

During our meetings I stressed that groupwork and project work were prominent at Aalborg University and it was agreed that these should be prominent in the Master's degree specification and curriculum. In fact being true to implementing my ideas for universities I stressed this within a course specification I designed together with Prof. Hervé Bourlard of IDIAP & EPFL, Lausanne, Switzerland on *Language Engineering (LE) applications* (see Appendix E.1) and on *Natural Language Processing (NLP)* together with Dr. Martin Rajman of EPFL, Lausanne, Switzerland and Prof. Hervé Bourlard (see Appendix E.2).

I can report an interesting incident from the last but one meeting of this project which was held in Amsterdam, The Netherlands, January, 1999. During a discussion of the topic content descriptions the project coordinator assumed by now that all our content descriptions for subject areas of the Master's were complete. I objected and said that at least one module description for a course on Natural Language Processing (NLP), which we agreed would be updated at the previous meeting in Edinburgh, Scotland, had not been (see Appendix E.2). There were two colleagues responsible for this content with one of them absent and the other said that his colleague had updated the description and I said it had clearly not been updated! The chair attempted to quash my objection saying that everything was OK. However, I persisted, and during a discussion of current proposals from institutions to host the Master's I came back again and pointed out that the NLP courses in the proposals, which were proper general NLP courses, did not match the current content description for NLP. My main problem with the content description was that it was too narrow and focussed on a specific approach to NLP, i.e. corpus-based NLP — it even had the title “Corpus-based NLP” (see Appendix E.2.1). Even worse, was the fact that it was clear to me that there were vested interests here because the narrow description fitted a specialised course on NLP offered by this content provider at his institution which one can see clearly even though it is in French! (see Appendix E.2.2). The chair relented since others agreed and proposed that for the next meeting I produce a proper general NLP contents description which I did (see Appendix E.2.3).

I would like to report another incident from the last meeting of this project which was held in Athens, Greece, March, 1999. The goal of this meeting was to conduct a self-review of proposals for the Master's from participant universities in the project. We broke into small groups to discuss the proposals and then returned to report back in plenum. Colleagues from University of Erlangen-Nuernberg, Germany, University of Sheffield, England and Patras University, Greece were to review the Aalborg proposal tabled by me<sup>3</sup>. The German Professor colleague was abnoxious starting immediately to question the depth of the Aalborg proposal, how much theory it had and

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<sup>3</sup>The Aalborg proposal for a European Master's degree in language and speech will initially be a specialised track of the Master's degree in Intelligent MultiMedia discussed in the previous section and in Chapter 2.

also the unique Aalborg style of education. Actually, it turns out that Aalborg has one of the closest matches to the Master's curriculum profile, which has a goal of training people for the language and speech industry, since Aalborg stresses not only theory but also engineering and applications as well as project-based education. I successfully defended (or thought I had) the Aalborg proposal demonstrating that there was sufficient depth and theory (Classic Knowledge) but also much strength in its groupwork and project-based approach (Romantic Knowledge). The German Professor questioned whether students are examined properly through the Romantic assessment methods at Aalborg and I replied that of course they are — detailing the extensive oral examination procedures which have been running at Aalborg for over 24 years now. The English colleague questioned whether it was possible to successfully supervise and assess students' Master's thesis work in groups and I said it was.

I thought I had quelled any doubts but during reporting back in plenum the German professor, to my shock, said that there were doubts about the assessment procedures at Aalborg. Another British Professor from the University of Edinburgh, Scotland reacted immediately and said that we had already agreed at a previous meeting (which the German professor was not at) that we were not to question the assessment or other procedures at any institution and that given an institution is a University we have to trust their procedures. Also, I reacted immediately and said that Aalborg University, Denmark would reject any suggestion that its procedures for Romantic assessment were in any way less rigorous than those of Classic assessment. The German professor went quiet. The English colleague came forth with his anxiety about students doing Master's thesis work in groups and he requested that Aalborg be forced to have students do their theses as individuals. He also added that it would be difficult to supervise a group of students especially if they were doing their thesis work as a project abroad at another institution. The project coordinator reacted immediately and said that we had not stated anywhere in the specification of the Master's that theses must be done individually. Also, I reacted and, addressing the project coordinator, asked whether it wasn't true that we had agreed and mentioned many times that we would encourage groupwork within this Master's. I pointed out that it is just as easy (or difficult) to supervise a group, even if they are spending time abroad, as it is to supervise individuals. The English professor went quiet. Aalborg's proposal for a European Master's degree in language and speech was accepted at the meeting with its integrated Romantic and Classic education and groupwork Master's theses included! First students can commence in October, 1999.

It turned out that the German professor's own proposal from Erlangen-Nuernberg was not accepted at the meeting due to some discrepancies between proposed courses and associated contents descriptions but also due to too many courses on theory, too many courses on language and not speech, and not enough on projects and practical systems. He was asked to revise his proposal and submit it again (I was not a reviewer of his proposal).

Another issue arose in respect of the wording of certification for the European Master's. When the project coordinator circulated the wording for the proposed certificate on email at first sight

it looked straightforward enough (see Appendix E.3). However, on a closer look it caught my eye that “born” was mentioned, and then also “place and country”. I wondered whether this was usual for a degree certificate and checked my three degree certificates from Ireland (University College Dublin), USA (New Mexico State University), and England (University of Exeter) and discovered that none of them carried these details. I contacted the coordinator, who’s based in The Netherlands, and pointed this out to him and also that in somewhere like the USA it might even be illegal to put age on the certificate based on the USA age-discrimination laws. He responded that these details are on all Dutch degree certificates and for me it was interesting to see how one’s private context can become promoted onto an international scale, maybe even with one not being conscious of this. He also asked how else could one be identified on the certificate and I responded, “by their full name” of course. I discovered that Germany also has age and place/country on its certificates and I wonder which other countries do?!

### 4.2.3 Speech communication sciences network

“Speech communication sciences” is an EU Socrates Thematic Network Project (TNP) (1997-1999) (see Bloothoof 1996, 1997, 1998, Bloothoof et al. 1997, 1998a, 1999a, 1999b, Hazan and Holland 1999 and <http://tn-speech.essex.ac.uk/tn-speech/>). In 1996 the EU launched the idea of Thematic Networks as new mechanisms for international cooperation. The focus of thematic networks is reflection and coordination for higher education within Europe. The network consists of 80 partner institutions which are mainly European but not limited to Europe. The goal of the network is to analyse the present status of education in speech communication sciences in Europe and then to make proposals on existing curricula and recommendations for the future. The network also encourages computer-supported teaching and use of the internet. The relationship between academic education and industrial needs and the need to develop specialised training is of importance. The network consists of four subgroups which focus on the topics of (1) phonetics (see Hazan and van Dommelen 1997, 1998), (2) spoken language engineering (SLE) (see Green et al. 1997 and McTear and Kouroupetroglou 1998), (3) speech and language therapy (see Beck et al. 1997), and (4) computer-aided learning and use of the internet (see Bowerman et al. 1999, Huckvale et al. 1997, 1998). I am a member of the SLE subgroup. We have meetings twice per year in various European locations and these meetings involve groupwork and plenary sessions.

My contribution to this project has been to produce (1) a response to a questionnaire on position statements on the state of the art in speech communication sciences, (2) three course descriptions for curricula in language and speech, (3) a section on “Project Work” as part of the contents of SLE studies, (4) a section on the “employment market” for spoken language engineers and (5) a description on the “European dimension” of spoken language engineering. We shall be concerned with (1-3) here since they are of relevance to implementing my ideas for universities.

First, some extracts from my response to the questionnaire which have been published in Bloothoof (1996), Bloothoof et al. (1997, p. 53) and Green et al. (1997):

“Courses should stress the theoretical as well as the practical, project work, and the ability to work in groups, as much of spoken language technology involves group work. Critical thinking and evaluation of research work from the latest publications should be taught. (CPK, Aalborg University)”

and,

“The student should be given a thorough grounding in how to develop applications which can perform speech recognition as well as synthesis and a view of the current state of the art in the field. It would be important to learn how to use current tools like Waves and HTK and any other necessary programming languages like Java and C++ in order to develop working systems. The current trends towards using spoken language technology in Multilinguality and Multi Media would need to be addressed. Most important would be a focus on the possible applications of spoken language technology including personal data assistants, mobile platforms, machine translation and spoken dialogue systems. Courses should stress the theoretical as well as the practical, project work, and the ability to work in groups, as much of spoken language technology involves group work. Critical thinking and evaluation of research work from the latest publications should be taught.”

My original response is given in full in Appendix F. Again, I am emphasising implementation of ideas for universities by stressing theory and practice but also groupwork and project work.

Next, together with Prof. Mike McTear, University of Ulster, N.Ireland I completed three course descriptions for curricula in spoken language engineering. The SLE group whilst conducting curriculum development decided to make a distinction between courses in SLE offered as part of other degrees and courses offered as part of a specialist degree in spoken language engineering. As shown in Appendix F we completed basic course outlines for courses in (1) *spoken language applications* and (2) *speech and language technology* which could be given as part of a degree courses in Artificial Intelligence, Cognitive Science or Psychology. Also, we completed a module profile for a module in *Computing for spoken language engineering* which would be given as part of a Spoken language engineering degree course.

Finally, the following extract is published in Bloothoof et al. (1997, p. 63/64) and Green et al. (1997):

#### **“Project work**

Most SLE courses have a significant project work component. For many institutions this involves using software such as Matlab, Waves, HTK, etc., in laboratories during course practical sessions. For others it means a more in depth study of a specific problem in SLE such as “dynamic time warping for isolated word recognition” or developing an “automated camera-man”. In cases where a Master’s degree is offered

then there is obviously a much larger project which is written up as a dissertation or thesis.

Some projects are in collaboration with industry (e.g. Cambridge, GB). There are cases where complete courses are actually projects (e.g. Erlangen, DE). Aalborg University (DK) has an education system where approx. 50% of the education and assessment is through group project work.”

Here again I am focussing on implementation of ideas for universities by stressing project work and the unique Aalborg style of education.

#### 4.2.4 Advanced computing in the humanities (ACO\*HUM)

“ACO\*HUM” (Advanced Computing in the Humanities) is another EU Socrates Thematic Network Project (TNP) (1997-1999) (see de Smedt and Apollon 1998 and <http://www.hit.uib.no/AcoHum/>). This theme of this network is the increasing use of advanced computing in teaching and learning in the humanities. ACO\*HUM is investigating the impact of new information and communication technologies (ICT) on curriculum content, scientific methodology and learning methods at institutions for higher education. The project is also focussing on the relevance of new technologies for humanities content providers, such as museums, libraries, and archives. This network consists of approx. 100 European universities, professional associations and other organisations. The network has four working groups which focus on the topics of: (1) computational linguistics and language engineering, (2) textual scholarship and edition philology, (3) history and historical informatics, and (4) history of art and aesthetic disciplines. I am a member of the computational linguistics subgroup. We have had a number of meetings in various European locations and these meetings involved groupwork and plenary sessions. One of our meetings has been an “International Conference on The Future of the Humanities in the Digital Age: problems and perspectives for humanities education and research” at the University of Bergen, Bergen, Norway, September, 1998 (cf. <http://www.futurehum.uib.no/> and de Smedt and Apollon 1998). There I published two papers on how IntelliMedia 2000+ and the CHAMELEON play a part in the integration of the humanities with science and engineering (see Mc Kevitt 1998a,b).

My contribution to ACO\*HUM has been to produce an introduction and conclusion of a chapter entitled “European studies in computational linguistics” for the ACO\*HUM handbook. This text is given in full in Appendix G and the full draft text for the chapter given on <http://www.hd.uib.no/AcoHum/cl/cl-chapter2.html>.

The following extract from the introduction shows that I am emphasising implementation of ideas for universities by stressing the importance of integrating the Humanities with Science/Engineering.

“It is becoming very clear that the integration of speech and language processing with respective signal and symbol processing is an instance of where the Humanities and

Science/Engineering are converging (Bloothoof 1998, de Smedt and Apollon 1998, and McTear and Kouroupetroglou 1998). When one moves to Intelligent MultiMedia and MultiModal systems incorporating graphics, vision and other modalities and then applied to art, music, dance, creativity etc. this convergence becomes all the more apparent (Maybury 1993, Mc Kevitt 1995/96, 1998a,b). Also, the internet or SuperinformationhighwayS are forcing the merging of the Humanities and Sciences/Engineering in terms of representing and accessing information in multiple modalities including at least text, voice, sounds and images/videos (Intelligent Multimedia). Language will be input in multiple formats including multiple natural languages as well as formal languages and images in the form of simple diagrams right up to videos. The Humanities will be concerned more with the content of the information being passed while the Sciences/Engineering will be more concerned with representation and transmission (Mc Kevitt 1998a,b) SuperinformationhighwayS which have massive stores of information in MultiMedia forms require more intelligent means of information retrieval, where “less” means “more”, through spoken dialogue and other methods. This is and will be a major application area of Intelligent MultiMedia (Maybury 1997). CL/NLP has a large part to play in the convergence of Humanities and Science/Engineering and in fact CL/NLP has since the sixties been the earliest field in the humanities to adapt to new information technologies.”

In the introduction, I stress the importance of groupwork and project work.

“The ability to work in groups is important for CL/NLP education and research and especially since it is seeing its home in relation to other communities such as speech which involves much interdisciplinary interaction and expertise. Courses should stress the theoretical as well as the practical, project work, and the ability to work in groups.”

Also in the conclusion, I stress balance and integration of theory and practice, integration of Humanities and Science/Engineering, and links between education and research.

“The role that CL/NLP plays in new applications such as personal communication devices will increase as will its links to speech and other modalities such as vision. It is clear that telecommunications companies already predict that the next generation of mobile phones will include screens with visual data as well as sound. Whilst focussing on all these applications it is important that CL/NLP does not forget that theory is also important and we would hope the balance between theory and practice is always there. Old barriers between the Humanities and Science/Engineering will decrease as Engineers see the need for more linguistics and phonetics in their systems and Humanists see the usefulness of engineering for testing their ideas and theories. With respect to education there will be a role for CL/NLP as part of degrees like the European Master’s degree in language and speech but also CL/NLP may be interested in establishing

a European Master's or Bachelor's of its own. If this happens then certification and accreditation will be important and just as it has been for the Master's in language and speech in which ESCA and EACL are involved. Links between education and research will become more important as students will more and more need to use tools and platforms resulting from research but also results from student projects can feed back into research. Also, in this fast changing field it lifelong learning will be important where teachers will be able to keep abreast of the latest developments. The ELSNET summer schools are very useful in this regard."

In the conclusion I make the following recommendations stressing again ideas for universities.

With respect to European studies in computational linguistics we have a number of specific recommendations which are the following:

- \* groupwork and project-based education should become more prevalent in CL/NLP
- \* investigate how research and technologies in the Humanities and Science/Engineering can be brought closer together
- \* institutions should focus on making CAL and internet-based tools available for their students
- \* there is a need for a European Bachelor's or Master's degree in CL/NLP
- \* links between education and research need to be increased and this is happening already within the speech community as we saw above with the Education Arena at Eurospeech-99; maybe the same should happen at EACL meetings?
- \* MultiLinguality and Intelligent MultiMedia & MultiModality will become major application areas of not just CL/NLP but also spoken dialogue systems (this has been already agreed by the "speech communication sciences" network mentioned above)
- \* the CL/NLP community should focus more to see how their work can be integrated with speech processing and respective applications; CL/NLP cannot survive on its own

We believe that it will be necessary for computational linguistics to follow these recommendations in order to survive in a fast and ever changing world and in particular with convergence of the Humanities and Science/Engineering but also with the processing of natural language text and speech being seen very much as a part of MultiMedia.

All of these excerpts demonstrate that I am continuously implementing ideas for universities in my curriculum development practice.

#### 4.2.5 CompTrain project

CompTrain is an EU Tempus-Phare project entitled "Restructuring of the (re)training of school teachers in computer science" (1996 - 1999) (see Ionescu 1997, 1998 and <http://nats-www.informatik.uni-hamburg.de/~tempus/>) The project includes a large number of Universities and Schools in

Romania and has western European partners from Aalborg, Denmark, Granada, Spain, Hamburg, Germany and Sheffield, England. The aim of the project is to retrain computer science teachers in Romania, primarily at secondary schools.

One issue within this project was to convey the importance of Information Technology (IT) skills as well as Computer Science (CS) skills. IT skills are concerned with word processing, internet use, databases, spreadsheets, etc. whereas CS is more concerned with theory, algorithms, computer architectures, etc. In Romania the traditional stress has been on CS and the problem with this is that although this is important in universities, it is as important for secondary school students to learn the basic IT skills of computing. The problem came from a historical need for elitism in the Romanian schools. Eventually, we pushed home the idea of IT being as important as CS. Here, again we face the need for stressing Romantic Knowledge to balance Classic Knowledge.

Another issue we encountered was that CS was hidden under Mathematics in many universities and the Mathematics Faculties controlled funds, who got Ph.D. students, computer equipment, etc. Hence, it was important for the universities to realise that CS was not a child of Mathematics but a subject in its own right. The western partners wrote up sections on the history of CS in the west (see Cowling 1998, Mc Kevitt 1998c, and Von Hahn 1998), showing that CS had split from Mathematics a long time ago. These sections were submitted to the Romanian Ministry of Education and they in turn made a recommendation to the universities. Some universities have already changed the way CS relates to Mathematics. Again, Romantic education involves allowing new subjects like CS to break away from Classic subjects like Mathematics.

At an initial meeting of this project hosted by Ovidus University in Constanta, July, 1997, I presented the detailed curriculum for the Master's degree in Intelligent MultiMedia, described in the previous section, and also stressing the unique Aalborg style with its integration of Classic and Romantic education. At the last meeting of this project held at University of Pitesti, December, 1998 I gave a short video presentation on the CHAMELEON system, described in Chapter 2, in operation. I pointed out that there were two important lessons learned in the development of CHAMELEON: usefulness of (1) groupwork, (2) project-based education and (3) integration of research and teaching. I pointed out that it was the job of the Universities in this project to bring the latest research ideas (albeit in a distilled form) into the secondary schools and to encourage the students in groupwork and project-based learning. Here, I was asking the universities to bring the integration of Classic and Romantic education to the schools. Another result is where a visitor (Paul Iacob) came to Aalborg University from the University of Transilvania, Brasov, Romania and he is now attempting to implement the Aalborg style within Brasov on at least one course he teaches (see Darvay et al. 1998). Romania's education system is very Classic and so that particular project will be of interest for me.

These actions on curriculum development for Romania which I have participated in have impacted not only upon Romanian Universities but also upon the Romanian government in the form of the Ministry of Education. In a country like Romania it is all the more difficult to ask people

to break from traditional thinking or Classic education and introduce new thinking or Romantic education although it seems we have been successful.

### 4.3 Examples from others

Here, I present two projects by others which demonstrate new ways of looking at education in university and school and which I believe are classic demonstrations of implementation of ideas for universities.

#### 4.3.1 Student company

Prof. Mike Holcombe of the Computer Science Department at the University of Sheffield directs a project entitled “Industrial Software Project Support Network” funded under the HEFCE (Higher Education Funding Council for England) Fund for the Development of Teaching and Learning (FDTL) initiative (see Holcombe 1999). Holcombe et al. (1998) gives details of work from a conference organised by the Computer Science group of FDTL projects. The project has enabled the establishment of University Industrial Software Projects designed to bring together university computer science and industry and Genesys Solutions, an IT consultancy and software development company, based in the Computer Science Department, which provides computing solutions to local businesses. The eight members of the company are all students in their final fourth year studying for a Master’s degree in Software Engineering. The project is the only one of its kind in the UK and gives students a better understanding of business and industry needs.

Genesys Solutions was established in 1997. It exists to prepare students for employment, by introducing them to local business clients with practical problems in need of software solutions. As part of their training, students attend a course on running their own business, provided by a local business consultancy organisation. In the process of managing and implementing clients’ software projects, they learn about the legal and financial framework of IT companies and about the design of cost-effective and quality-assured IT solutions. Genesys Solutions clients include a stamp dealership, a health care company, a medical research group and the regional office of a national charity. The company has worked on systems for invoice processing, engineering standards validation and the management of donations. They have also been involved in creating Web sites with on-line database access and developing training materials in the use of the Internet. All the students have some prior experience of team project work, having been involved in the Department of Computer Science ‘Crossover’ project as first years and in the ‘Software Hut’ project for second year students, which also involves software development for local commercial/industrial clients including two Sheffield engineering companies, a utilities company and a charity. Holcombe (1999) says,

“Having a student-run company helps dispel the belief held by some employers in the IT sector, that degree courses in computing do not adequately prepare graduates for

employment. The industrial software projects we run are designed to give students experience in solving real business problems, communication and negotiation with clients, team management, and planning of quality-assured software systems. We have even been told by some of our clients that the quality of our students' work is considerably better than much of the output from the software industry.

The company members are responsible for planning and managing their project time-scales, for organising their work in teams and for adopting quality assurance procedures. We know these are skills which employers are looking for in new IT graduates: skills which we feel are best developed by the experience of meeting real business requirements."

Richard Allen MP (Member of Parliament), Chair of the House of Commons IT Committee, visited the Computer Science Department at the University of Sheffield on Friday 14th May, 1999 between 11.15am and 12.15pm. He holds a post-graduate degree in the subject and expressed enthusiasm for the work being done by students in Sheffield.

This project involves key components of ideas for universities including groupwork, project-based learning, and active learning and we need more of its kind. It is good to see that the project has not only funding from the HEFCE but also has government backing from an MP.

### **4.3.2 Children do science**

Dr. Robert Ballard is an underwater explorer who discovered the wreck of the Titanic in 1985. He has recently become a pioneer in technology and interactive education (see Miller 1999). Ballard developed the Jason project in 1989 after he received thousands of letters from children wanting to know more about his adventures looking for the Titanic. The Jason project uses satellites, the Internet and videoconferencing to allow pre-highschool students all over the world to tag along with scientists on real research expeditions. Ballard's current expedition site is the Amazon rain forest in Peru and he says in Miller (1999), "It's not like a textbook — this is where the action is." and he says Jason moves education, "beyond the classroom blackboard to the acquisition of knowledge." The expedition culminated in a series of live broadcasts for students from March 1st - 12th, 1999 and were available on <http://www.jasonproject.org>. Previous expeditions have included Monterey Bay, California, the Mediterranean Sea, and the Galapagos Islands and Belize.

For this year's expedition about 25 students and some teachers are flown to the site to work with scientists. 700,000 other children who have studied rain forests follow from their classrooms and other locations. These include 34 star-of-the-art centres where children can interact with researchers through two-way video and remote-control cameras and vehicles developed by EDS, a sponsoring technology company. Jason has a \$5 million annual budget and a growing web presence. Ballard had trouble selling the idea 10 years before where sponsors were hard to find and where most people didn't have access to the internet. Jason is not just for rich school or children: Foster Elementary in Arlington, Texas serves low-income children from 36 cultures but being able to

interact with real scientists on-line has made children feel as if they have access to the advantages rich children have. At Foster, Susan Williams' 6th graders have used Jason for 5 years and she says, "If someone told me I couldn't teach the Jason Project, I wouldn't want to teach." Ballard thinks of himself "as an explorer and scientist" and says, "Kids are too. The first question they ask is 'Why?' I'm dealing with kindred spirits, and I feel as close to them as scientific colleagues."

This project involves groupwork, project-based learning, active learning, integration of research and teaching, all part of ideas for universities, and gets away from the textbooks and classroom blackboards of Classic education. The children participate in research and so the distinction between scientist, teacher and student becomes blurred as it should do in Romantic education.

# Chapter 5

## Conclusion

My goal in the previous two chapters has been to present ideas for universities and to show how I am implementing these ideas in my practice and how they are received. Now, I shall summarise the dissertation, show relationships back to others' ideas, the M.Ed. group discussions and readings and discuss possibilities for future work.

### 5.1 Summary

My formal experience of education comes from having studied and been employed at five universities, four of which are in Europe and one in the USA. I have received degrees from three of the universities, been employed at three of them, and am presenting this dissertation in part fulfillment for a degree at one of them (M.Ed.). I started out by detailing my experiences of education which now clearly fall into the two categories *Classic* and *Romantic*, where the former emphasizes monologue, formal lectures and individual sit-down written examinations and where the latter emphasizes dialogue, groupwork, active learning and interactive assessment methods. Classic education alone is bad because it stifles thinking and creativity. Classic education alone is not social and encourages monologue rather than dialogue. Traditional assessment methods are used to reinforce Classic education. Romantic education alone is also bad since students will allay facts and theories for the interesting and exciting groupwork and active learning. Non-traditional assessment methods are used to reinforce Romantic education. Only two of the universities, from which I have had formal educational experiences, have education programmes which incorporate Romantic education methods: (1) The Sheffield M.Ed. programme and (2) the complete education programme of Aalborg University, Denmark. My ideas of what a university should be are founded on these educational experiences.

I have attempted to provide my ideas for what a university should be. These ideas include an integration of Classic and Romantic education and in particular to focus on *what* is the message?, *who* is the messenger?, Classic and Romantic assessment, groupwork, active learning, integration

of teaching and research, and interdisciplinary studies. I believe this will stimulate more thinking and creativity in learning. In essence my idea of a university is one where education is very much a social process and where assessment is exciting rather than a chore. The idea is very much in tune with the writings of Newman (1852a,b,c).

I have shown how I am implementing the ideas in my practice through teaching, research and curriculum development as part of the umbrella Intellimedia 2000+ project at Aalborg University. With respect to teaching I have shown that I am using the ideas incorporating groupwork, active learning, Romantic assessment, integrating teaching and research and interdisciplinary studies into a course on *Readings in Intelligent MultiMedia* and that this has been successful. With respect to research I have shown that I have facilitated groupwork in the development of the CHAMELEON software system which demonstrates the integration of language and vision processing and this has been successful. By establishing a reading group I have provided a basis for reviewing state of the art literature relevant to the development of the CHAMELEON as well as a forum for bringing together views from Humanities and Science/Engineering. In IntelliMedia 2000+ integration of research and teaching is made possible by not only having the development of a CHAMELEON demonstrator, but also having a Master's education where students can use it and where they can be involved in its development. The CHAMELEON and Master's education not only involve learning about engineering of software for speech, text and vision processing but also about humanistic elements of these subjects. Project supervision, studytrips abroad and summer schools also provide a forum where integration of teaching and research can take place. With respect to curriculum development I have shown that I have incorporated the ideas into one local and four international curriculum development projects I am participating in and this was well received and successful.

## 5.2 Relation to others' ideas

The ideas for universities proposed here are, of course, not new. The integration of Classic and Romantic education has been implemented at Aalborg University, Denmark and the M.Ed. degree at the University of Sheffield, England and probably at other Universities, mainly in the USA, not mentioned here. In Chapter 2 whilst discussing others' views on education we looked at philosophers, contemporary academics, academic managers and popular scientists. My ideas have much in common with theirs, and in fact have, in part, been influenced by them. First, a special mention for Pirsig (1974) for it is from him we have borrowed the terms *Classic* and *Romantic* with which this dissertation is framed. His discussion on what *Quality* is, demonstrates the need for dialogue and *Romantic* knowledge. Goleman's distinction between *rational* and *emotional* intelligence matches very well to Pirsig's coupling. Also, Nachmanovitch's (1990) discussion of creativity and improvisation in terms of *free play* is very much in the vein of Pirsig and it is interesting that both of them gain inspiration from the philosophy and literature of Zen.

My ideas for universities have been influenced very much by John Henry Newman's *The idea of a University* published in 1852. Of his two basic principles I certainly agree with the inseparability of research and teaching although I do not agree with his other principle that knowledge must necessarily be an end in itself (*liberal* knowledge). Certainly, much of Romantic education is about the use of knowledge rather than knowledge being an end in itself. Triggle (1998) points out that universities have changed over the centuries, where academics are now businessmen and universities are businesses, and that, unlike Newman's dream of *liberal* knowledge, they now produce *useful* knowledge, enough to make Newman and Wilde turn in their grave.

Newman (1852a,b) focusses on the unity of knowledge and its interdisciplinary nature and the need for dialogue, what he calls *liberal* education – Roger Downer's "village pub" (see Chapter 2), which is also a strong theme of Pirsig's (1974) distinction between Classic and Romantic Knowledge. Pirsig points to the importance of interdisciplinary work, and integrating science and art into one language "in a kind of harmony". Again, this call for interdisciplinary work is a major component of our ideas for universities. Also, Triggle (1998) calls for more interdisciplinary work, and in particular, on (non-linear) ways of integrating science and technology through formal university structures. Horgan (1996) notes that fields of study are converging and argues that science is all engineering now in what seems to be an end of Classic knowledge. This issue has impacted on my research on the integration of language and vision processing but also on curriculum development actions which focus on the integration of speech and language (and vision). All of these activities include aspects from both the humanities, science and engineering as detailed in Mc Kevitt (1998a,b) and de Smedt and Apollon (1998). Newman's (1852c) definition of a gentleman is the type of student which I hope would attend and graduate from a Classic/Romantic education.

Stevenson (1881) makes an apology for idlers and points out that we can actually learn a lot by idling. His distinction between Mr. Worldly Wiseman and the idler separates for me those who are the result of solely Classic or solely Romantic education respectively. Stevenson points to the staleness of people like Worldly Wiseman and Schank and Cleary (1995) refer to the same staleness of Classic education in USA classrooms of today. Stevenson says, "And if a man reads very hard, as the old anecdote reminds us, he will have little time for thought." This is a key point, too much Classic education gets in the way of Romantic education, i.e. thinking and creativity. Wilde (1990) tells us that he lives in terror of becoming Mr. Worldly Wiseman and Cole (1998) demonstrates for us the fallacies Mr. Worldly Wiseman can dream up. Rowland (1993) points out that the tutor should see himself more in an enquiring role rather than being didactic.

I cannot agree with Dreyfus (1998) with his attack on the internet and his claim that web sites are full of anonymous information — for example, most Industries, Institutions, and Universities check very carefully what information they present and also many individuals are careful what they put on their personal web pages due to the very fact that they are not anonymous in society. Also, there are consequences of how one performs in discussions — for example, academic discussion electronic networks where one's academic reputation is at stake in front of other academics. In any

case anonymous information exists just as much in the real world as it does on the internet. In fact, I disagree with Dreyfus in general on this matter and although he may be right that Kirkegaard's dislike of the Press may extend to the internet I believe there is no reason to fear the internet. The internet provides a knowledge source, much like a library, where information is available to anyone who has computer access and a resource which encourages active learning. The only thing it takes away is control over what is seen and who determines that, i.e. the "message" and the "messenger". Also, we saw in the previous Chapter how Ballard has put the internet to good use for teaching children and Dekker (1998) demonstrates how he has used the internet successfully for teaching live whilst De Smedt (1998), McEnery and Baker (1988), Fellbaum and Richter (1998) and Hazan and Holland (1999) show how Computer Aided Learning (CAL) tools and the internet can be used for education in the humanities and engineering. Triggles (1998) points out that freedom and low cost of information now due to the rapid developments in computing power and communications is precipitating change. Schank and Cleary (1995) say this is a good thing and they see good computer tutoring systems as another way in which this individual learning can take place. Unlike Dreyfus, I have no problem with the internet! (but I do not wish to control education). If we stifle the internet we stifle Romantic education.

Feynman (1992) is worried about how we educate today and strongly attacks too much reliance on Classic education and calls for more project-based learning. He gives his experience in Brazil, where students were just memorising facts but not using them, as an example of what can go wrong with too much reliance on the Classic style. This reinforces Stevenson's point about the young man with all the facts but not a shot in his locker. Schank and Cleary (1995) are also worried about the USA education system and believe a way out is 'learning by doing' and to use educational software to tell stories (project-based learning), which Schank believes are the best way to transmit knowledge (see Schank 1990, 1995). Triggles (1998) also points out that changes to universities are being spurred on by the rapid change in learning technologies. Rowntree (1997) informs us of the best ways to use these technologies. Schank's example of 'learning by doing' software, the Sickle Cell Counselor, parallels how our students use, and are involved in the development of, the CHAMELEON platform developed as part of IntelliMedia 2000+. Schank points out that stories laced with humour and emotions create memories upon which people can hang knowledge. The focus on emotions is also a major theme of Goleman's (1996) *emotional intelligence*. Hence, Feynman and Schank's focus on project-based learning very much supports the Romantic education model. Kjærdsdam and Enemark (1994) support the Classic/Romantic integration of course since they discuss the advantages of the unique Aalborg style of education at Aalborg University, Denmark. They focus on the strengthening the links between theory and practice and to encourage dialogue between the two. All of these methods will involve teachers becoming more aware of the process of teaching and students performing deep learning in the sense of Ramsden (1992).

Triggles (1998) points to the death of the guilds as earmarking a change in education. The

organisations worked with information coming from the bottom-up in a heterarchical manner whereas today's universities have limited guild power and are very much top-down in management style. I think that Triggles is right in that there will have to be changes in the way universities are managed if our ideas for universities are to work. Certainly, Aalborg University, Denmark has a management structure where there is hands on management by the Deans of Faculties which ensures they are in touch with the everyday working of the University. Triggles also calls for lifelong learning which I believe will also be important for implementing our ideas in universities, i.e. Classic Knowledge may be stale but Romantic knowledge is always changing. I have participated in teaching on a lifelong learning course on Intelligent MultiMedia which was offered to past students of Aalborg University in 1997 and now again in 1999 and this was a very successful of getting research and new ideas out into the industrial world. Triggles also points to the need for more integration of science and technology through formally organised university structures.

In summary, I believe that most of the authors discussed here would all support our ideas for universities. I am afraid that Dreyfus would not, since his attack on the internet as a learning resource is for me an attack on Romantic education. Also, it may be the case that Newman would not completely agree with my ideas since his call for liberal knowledge (knowledge being an end in itself) may rub up against Romantic education which many times considers the use of knowledge for some other end. Also, from others' views we learn that in order for the ideas to work in today's universities there may need to be a change in university management structures, more lifelong learning, formal moves toward integrating the sciences, engineering and humanities to encourage interdisciplinary work and a focus on emotional as well as rational intelligence. These changes will be all the more difficult given that the universities of today are businesses and academics more and more like businessmen, a far cry from Roger Downer's "village pub".

### 5.3 Relation to Sheffield M.Ed. course

We can now turn to see how ideas for universities relate to those which came up during M.Ed. group discussions and to those of authors of set readings from the M.Ed. course. My ideas have much in common with fellow M.Ed. students and these authors and in part, have been influenced by them. Ideas from M.Ed. discussions and the readings are discussed with respect to the modules in which they occurred.

#### 5.3.1 Groupwork

One issue which kept coming up during this module on groupwork (see Mc Kevitt 1993) was the significance of *social context* and this is certainly something which I feel is important in implementing ideas for universities. I think it was much easier for me to implement the ideas in my practice at Aalborg University, Denmark which already advocates these ideas in its general strategy. I am not so sure this would have been so easy at the other Universities where I have

studied or worked (see Chapter 2). There would have been all sorts of problems with alternative methods of assessment, active learning, and groupwork. There would have been questions like: “Where are the exam questions for this course?” and I would have answers like “There are no traditional sit-down written exams for this course!” Hence, there would be a clash of social contexts with Romantic facing down Classic.

Also, we discussed the *cultural context* and asked how can we implement groupwork in the UK cultural context when groupwork involves cooperativity whereas society isn’t cooperative. This point worried me and I noted the following (Mc Kevitt 1993, p. 4):

“\* Groups are cooperative but society is not cooperative?”

The latter point worried me. Although the idea of groupwork is obviously a useful one, much of today’s Western English-speaking society has moved towards individualism and competition rather than cooperation. Certainly, the USA has emphasised this approach and now the UK is quickly following suit. Hence, the problem is: how can we cooperate in groups when the social context is one of competition and greed?”

Hence, the social and cultural context of practicing ideas for universities is important and what is seen as acceptable in one social context and culture may not be acceptable in another. Denmark has a very strong socialist democracy which pervades society and I believe this made it much easier for me to implement ideas for universities there. Also, the funding context is significant where Denmark is the European country which spends most per capita on education whilst the UK has continuously reduced its spending.

We stressed the importance of dialogue and the advantage of groupwork being that one can avail of many different points of view. This point has also come up a number of times during this dissertation where many of the authors presented in Chapter 2 advocated the importance of dialogue and certainly dialogue is a very important part of our ideas for universities as presented in Chapter 3. Dialogue has been highlighted in my teaching, research and curriculum design practice as was shown in Chapter 4.

Another issue which we touched on was the importance of relationships between research and teaching. This also came up a number of times in Chapter 2, in fact Newman was one of the first to highlight the importance of this issue, and is also an important part of ideas for universities (see Chapter 3). Links between research and teaching have also been significant in my practice as we saw in Chapter 4.

One of the points which came up a lot during the M.Ed. course was that groupwork was familiar to some (such as those working in the English Language Teaching Centre, ELTC) but not to many of us who were Lecturers. At the time we postulated that this might have been due to the nature of the difference in the subject being taught. However, I have seen at Aalborg University, a complete university based on groupwork and project-based learning, that also Engineering and Science can be done very much by groupwork and in fact it is the Engineering sector at the university where groupwork is deemed most successful.

Looking at the readings, Leftwich (1991) points out that concern about teaching quality in British universities cannot enhance this teaching if no one is prepared to provide funding for it. He criticizes the British government for treating universities as commercial organisations when such organisations are by definition non-private! He notes that at the end of the day it is the students who lose out. This goes back to what Trigg and Barrett said (Chapter 2). He says:

“Many British graduates emerge from their university studies in a competent but dulled condition, without the sharpening of analytical confidence, curiosity, independence of judgement and flair for critical evaluation, initiative, ideas and innovation which committed, well resourced and properly rewarded teaching *could* both generate and sustain. This must be the life-blood of any rapidly changing modern society.” (p. 289) (his italics)

Leftwich gets at the crux of what can happen in education when the message (Classic Knowledge) becomes more important than creativity (Romantic Knowledge), and especially when there is not enough funding. This has much in common with the ideas of Schank and Feynman (see Chapter 2). The dulling which Leftwich talks of is similar to Stevenson’s portrayal of “dead-alive, hackneyed people”. This is an important point in that we will have no chance to increase Romantic knowledge let alone Classic knowledge at universities if there are inadequate funds. I believe one of the reasons for the large successes of Aalborg University is its heavy funding by the Danish government. I have seen the “dulled condition” of British students Leftwich talks about at both the University of Sheffield and Exeter University, but also at the other Classic education universities with which I have experience. However, I have observed that the students at Aalborg University, Denmark rarely look dulled and are much more excited about doing their work.

Winter (1989) focusses on the need for *dialectics*, which he sees as a challenge to positivism, and the integration of theory and practice. He provides six principles for the conduct of action research and I believe I have used these in implementing ideas for universities as described in the previous Chapter. This was not a conscious process of following Winter, but now looking at what Winter has said I can see that I have followed his principles. His principles are: (1) reflexivity, (2) dialectic critique, (3) collaborative resource, (4) risk, and (5) plural structure, and (6) theory, practice and transformation. For Winter *reflexivity* is about moving from practice to theory and back again and we cannot get away from the basic fact that our theories come from experience and practice in the first place. How can we analyse the process of making judgements without imposing a further set of judgements? *Dialectics* is a general theory of the nature of reality and of the process of understanding reality. It comes from the original Greek meaning of *the art of discussion*. Winter proposes dialectics as a challenge to positivism. *Collaborative resource* refers to the conduct of research within its context and how can this possibly be done impartially? What sort of relationships exist between colleagues, students, and others in the institution? On *risk* research will provide results which will threaten accepted theories in the field. How do we work with, and depend on, colleagues who may feel the brunt of such a threat? On *plural structure*

research involves differences, contradictions, questions and possibilities. Winter suggests that research reports should be open, plural and questioning and it will prevent readers from thinking that the report is just representing our personal opinions. On *theory, practice, and transformation* what is the relationship between theory and practice? or between research and action? What Winter says has much in common with the views of Feynman, Schank, Kjærdsdam and Enemark, and Triggle (see Chapter 2). They have made reference to this intertwining of theory and practice, dialectics, and the need for collaborative work.

Winter's first principle is that of *reflexivity* and I have used this principle in my teaching practice (see section 4.1.1) by asking the students to show how the readings relate to their projects and to IntelliMedia 2000+ but also in my direction of the IntelliMedia 2000+ project by enabling students to work on developing CHAMELEON whilst also enabling them to use CHAMELEON for their projects (see section 4.1.2). During a studytrip abroad the students were able to see how their Master's and projects were relevant in the context of research projects at major universities and companies (see section 4.1.5). Also I was able to report to research students at the summer school examples of student projects from the Master's (see section 4.1.6). The second principle of *dialectics* is encouraged in my course and much of the time I would probe the students with questions as well as interjecting here and there and they did the same. No knowledge was taken as sacred and everything presented in class was subject to critique by everyone (see section 4.1.1). Also, in the development of CHAMELEON we did everything by discussing it in groupwork and no knowledge was sacred. In the end, CHAMELEON was a product of dialogue rather than one dictator deciding everything (see section 4.1.2). More important, the IntelliMedia 2000+ project itself has emerged from my need to integrate language and vision processing which was a move away from the current reductionist trends in the field where researchers in language and vision processing had worked apart (see Appendix C). Also, in the curriculum development projects I have been involved in (see section 4.2) I have very much followed this principle and especially with respect to the reported incidents in the European Master's degree in language and speech (see section 4.2.2).

With respect to *collaborative resource* Winter refers to the impartiality of research within its context and the fact that knowledge emerges from multiple viewpoints. With respect to my readings course it always encouraged looking at things from various points of view and it was these multiple viewpoints which gave meaning to the course (see section 4.1.1). The CHAMELEON was developed in the same light and its application and final constitution was emerged from multiple points of view of the working group. If any single person was unhappy about something we strived to accommodate their viewpoint. Curriculum development for IntelliMedia 2000+ and for the European Master's was conducted in the same manner where groups discussed the proposed contents descriptions (see sections 4.2.1 and 4.2.2 respectively). My complaint about the content description of the course on NLP (see section 4.2.2) was due to the fact that some colleagues were not impartial in their presentation. In fact what they had done was to include a narrow course

description from their own institution rather than a more general and appropriate one.

On *risk* I certainly feel that my methods of introducing active-learning into courses and also new theories arising from research may threaten people in the field. On *plural structure* certainly any action research involves contradictions, questions and possibilities and I have tried to capture these with respect to my teaching. The success of the readings course was not obvious at the outset (see section 4.1.1). *plural structure* of the development of CHAMELEON is discussed in Brøndsted et al. (1998), and partly here in the previous Chapter, where we openly discuss how the system was developed as well as the system itself. On *theory, practice and transformation* with respect to my teaching, research and curriculum development practice I have always strived to link theory to practice. This has certainly been a focus in the course on readings where we looked at how the theories in the course content could be applied to student projects. Also, this has been a focus of the CHAMELEON where our general goal was to integrate the processing of language with that of vision but also to implement this goal within a practical context. This has been followed within my curriculum development practice with respect to Master's in Intelligent MultiMedia and other courses.

Ottaway (1968) discusses the distinction between tutorials and seminars and the confusion that has arisen over these. He makes the point that the optimum small-group size is that of between 7 and 12 participants and possibly up to 15. He notes that by free discussion in groups people will come to a better understanding with independent thought where creative ideas can emerge and students will learn from each other. Again, this is in concordance with Feynman, Schank, Kjærdsdam and Enemark, Rowland and Triggler. Certainly, I have found this in my practice of teaching, research and curriculum development. Class sizes at Aalborg University are not more than 20 in any case due to the high teacher-student ratio. However, I would have found it very difficult to implement Romantic innovations in some of my courses at Sheffield where class sizes had between 40 and 100 students and difficult to see how this would improve with continued government cutbacks. I have also found that students learned a lot from each other in the readings course (see section 4.1.1). In the curriculum development activities I have been involved in it was also the case that we learned a lot from each other through discussion in groups. For example, in the Socrates network meetings there were people from different academic disciplines in the humanities and sciences/engineering and they were able to learn from each other's different point of view (see section 4.2).

Jacques (1989) discusses the difference between content and process in communication and he notes that as a group grows in size then fewer participants have a chance to participate. I have certainly felt this to be true in the curriculum development meetings I have been involved in (see section 4.2). When we broke into subgroups much more was achieved because too many tried to speak in the larger plenary group. Jacques also notes that groups should be as heterogeneous as possible based on age, sex, nationality, and personality. I agree with this and am certainly happy that over half of the students for the two last intakes on our Master's in Intelligent MultiMedia

course in Aalborg are foreign and that there are a number of females on the course. This did become a factor and I remember in one particular class of my course on readings where we discussed religion and knowledge people were able to bring in local knowledge from their own religions. In curriculum development the Socrates and Tempus meetings have a wide range of nationalities, ages, sexes, areas of expertise and personalities (see section 4.2). In the development of CHAMELEON the Working Group had two foreigners out of six people and this made this group direction much more bearable than if it had just been myself (see section 4.1.2). Jacques makes the following point:

“From the point of view of cognitive learning, with problem solving for example, the mixing of quicker or more intelligent students with their slower counterparts can enable a teaching process between the students to take place.” (p. 7)

I have certainly noticed this in the project groups I am supervising at Aalborg University but also during the Socrates curriculum development meetings the younger academics were able to learn from the more senior professors. Jacques gives a word of warning with respect to groupwork, which we also saw in Chapter 2 from Kjærdsdam and Enemark:

“Yes often the most powerful influences are the personal likes and dislikes of personal participants. People tend to agree with individuals they like and disagree with those they dislike even though both may express the same opinion. By and large, groups composed of compatible people learn well what they want to learn.” (p. 7)

This is true to some extent but I think it depends on the type of group one is referring to. A student group might behave like this but at the Socrates curriculum development meetings I have attended academics relished in disagreeing with those they liked. Again, much of what Jacques says is in the same vein as the views of Feynman, Schank, Kjærdsdam and Enemark, and Triggler.

With respect to power and control, Rowland’s (1991) paper focusses on the transmission of power from tutor to participants in a course. He uses fictional writing to investigate this. He notes the anxiety felt by the participants as they realise they are not going to be spoon-fed. The fictional dialogue focusses on the difference between a led group and a leaderless one. It came out that process was significant in the leaderless group while the product was significant in the led group. This shows up the need for a tradeoff between both in teaching. Again, we have a word of warning on the pitfalls of groupwork. I found exactly the same anxiety when I conducted the course on readings (see section 4.1.1); the students suddenly had to come to the realisation that they were also going to participate in giving the course as well as myself. They were also anxious when they realised that they had to stimulate discussions as well as me and that they had to ask questions of the other students presenting. Rowland’s fictional dialogue focussed on the difference between a lead and leaderless group and that there is need for a tradeoff between both. Certainly, I found this in the class where I had to take the lead to keep discussion ticking along.

Pinar (1975) notes that Departments have become compartmentalised and and says that group-work can help to solve this problem. Also, institutions have become removed from individuals so that they are immortal and not accountable. Hence, when a disaster does occur, there is no one to point the finger at. Certainly, I have found that through my practice I have been able to stimulate interdisciplinary work through inviting teachers from the Humanities to participate in my course on readings and to participate in a reading group as part of the IntelliMedia 2000+ CHAMELEON project development. I used these groupwork sessions to focus on the interdisciplinary issues. Also, with respect to curriculum development much of our groupwork in the Socrates projects focussed on interdisciplinary issues with many participants coming from different departments. Pinar says:

“A school of education organized under hopelessly irrelevant departmental headings that isolate individuals from each other and come from a mentality that belongs at least to the early fifties could be transformed into a set of project teams.” (p. 351)

This goes back to much of what Newman said on the fact that knowledge must be treated as a whole (see Chapter 2). This point is being made over and over these days by numerous people. Gleick (1988) makes the point that researchers in chaos theory such as Doyne Farmer found it hard to get off the ground because of the rigid structure of Departments in Universities. Waldorf (1993) makes the same point about researchers in complexity theory and artificial life such as Chris Langton. Feynman (1992) points to the same problems in Physics. Researchers setting up new interdisciplinary studies in Cognitive Science and Artificial Intelligence have had similar problems. Pinar’s point also relates to the whole goal of the IntelliMedia 2000+ project which is to link together four groups from three departments with the goal of integrating language and vision processing which had heretofore been worked on separately in different departments at Aalborg University and internationally (see Chapter 2 and Appendix C). As we saw in Chapter 2 a number of others have called for interdisciplinary work and I have argued that it may be necessary to fulfill the goals of Romantic education. Luckily enough the development of IntelliMedia 2000+ programme was a top-down decision which made it easier for departments to integrate. It would have been impossible at Sheffield University though, where the groups representing vision, speech and language processing at the university would have been very difficult to integrate for numerous political and competitive reasons.

Van Manen (1988) focusses on the relationship between research and teaching. He says that we treat students as objects of study rather than as people from which we can learn. He says,

“I have seen thoughtful educators involve themselves in graduate work and adopt some research perspective and language that strangely transforms them *away* from a pedagogic orientation towards an orientation that is typical of the scientific discipline in question. Now this educator, who once could offer such sensitive insights into the processes of teaching and parenting, speaks with an altered voice.” (p. 441)

I have seen this many times in my research field and many even refer to work as simple if it uses

simple and direct pedagogic language. In fact one professor colleague at Aalborg, Denmark uses the word *pedagogic* to describe scientific or engineering writing which is clear and understandable rather than being produced in some contrived and obscure language. This point has been made by Gethin (1992) about linguistics where he argues that linguistics has become a strange field with linguists conducting strange activities, and using strange languages, that are totally removed from the real world. Gethin points to the fact that researchers in linguistics have involved themselves too much with describing abstract theoretical grammars which are unrelated to the teaching of language. He gives examples of how learners of English as a foreign language find it easier to learn English through examples of use rather than through learning abstract grammars. Feynman (1992) found the same with Physics. I believe that because of all this obscurity we have so many people such as Dawkins, Feynman, Hawking, and Gleick writing popular science books today! Van Manen's 'altered voice' is the voice of Mr. Worldly Wiseman with his Classic Knowledge. His focus on the relationship between research and teaching would please Newman who campaigned for their integration. Feynman, Schank and Kjærdsdam and Enemark and Rowland also stressed the need to treat students as people teachers can learn from (see Chapter 2).

As discussed in the previous section I, and a number of others, believe that integration of research and teaching is important for implementing ideas for universities. I have followed it resolutely in my practice of directing IntelliMedia 2000+ and it plays a major part of the readings course, research activity, and curriculum development. Intelligent MultiMedia Master's students were employed to work on CHAMELEON whilst CHAMELEON was used by students for their projects. In fact a principle of development of IntelliMedia 2000+ was that the research and teaching be developed in unison. I have included aspects of research on language and vision integration in my teaching (see section 4.1) and also within courses of the Intelligent MultiMedia Master's curriculum (see section 4.2.1). I invited researchers within IntelliMedia 2000+, and from the Humanities, to participate in teaching of the readings course (see section 4.1.1). Van Manen points to the fact that researchers often neglect their students and families due to their pressing workloads and requirements to publish. Again, social context is at work here and certainly I have noticed that the absence of requirements to publish and enter for research selectivity in Denmark means that people can pursue more Romantic Knowledge and education rather than spending all their time writing papers. It also means that people are not afraid to spend time on their teaching. Van Manen says that we treat students as objects of study rather than as people from which we can learn and this is exactly what characterises Classic education. Romantic education is about moving the centre away from the teacher to the student.

### 5.3.2 Assessment

In this module on assessment I considered *memory, understanding, application and creativity* to be the central components of assessment and in increasing order of importance and difficulty to assess (see Mc Kevitt 1997a). I also noted that today's education system does not reflect this ordering

and considers memorization to be more important. In my teaching practice I have implemented assessment through presentation, reading and writing for the readings course (see section 4.1.1). This method of assessment worked well for the course and I believe it enabled better assessment of student and tutor creativity and thinking. In Mc Kevitt (1997a) I noted that:

“In fact, some of the brightest people find it a totally useless task to sit down and memorize loads of information and are much of the time involved in thinking rather than memorization. This brings back memories of *An apology for idlers* and *The idea of a University*, pieces of prose from Stevenson and Newman.” (p. 2)

I noted that it is hard to assess understanding, asking questions, and creativity with examination papers. Some argued that it is not possible to assess understanding and I disagreed and argued that the understanding of anything can only be assessed by enquiry through interactive dialogue. This is exactly how I assessed the students in my readings course (see section 4.1.1) and in projects (see section 4.1.4).

One of the issues discussed very much in this module was the importance of presentation as a means towards assessment. One person (Prue) from architecture pointed to the use of *crits* where presentations were used for assessment (by critics) and these are very much related to the assessment of students' projects at Aalborg University through oral presentation. Presentation played a part in the assessment of final year student projects at Sheffield Computer Science Department and also it is common to assess interview candidates for academic positions in such a manner.

We noted in this module, as in the previous, that the social and administrative context directly affect how we do assessment. Innovative assessment methods must have a conducive social context. Certainly, I believe that it would have been difficult for me to implement the assessment methods I used in Aalborg at any of the other institutions presented in Chapter 2. As mentioned in the previous section, lots of questions would have been asked about where the exam questions are and so on.

In terms of the characterisation of assessment as student formal (SF), student informal (SI), teacher informal (TI) and teacher formal (TF) I have conducted student informal assessment by assessing the students' presentations and they have conducted teacher informal assessment by telling the semester coordinator that my course was good, but also teacher formal by filling out written forms on assessing my course (see section 4.1.1). My *student informal* assessment method focussed on presentation, reading, writing and dialogue interaction.

Jerry and I investigated vested interests in this module and we discussed the fact that a lecturer may be interested in passing most of the students, not giving too many Grade 1's otherwise being seen as too lax, and maintaining power. We also discussed that the students should know what the assessor thinks is important and that assessors can penalise students for attacking theories they believe in. In my course on readings I was careful to ensure that the students knew exactly what the methods of assessment would be and this was especially the case since it was a new approach

(see section 4.1.1). The only vested interest I had was to test whether this innovative method of running a course was acceptable. It could be argued that I set the assessment procedures to fit my style of teaching. We also covered prejudice in assessment and Prue noted that this has happened in her Department where teachers have steered the direction of work. Prejudice has advantages though since it can be a defence of the student (i.e. good prejudice). An argument in her department against this style of assessment is that it is more time consuming but I would find setting formal examinations and correcting them much more time consuming.

One thing which struck me in this module was the handout given by Richard on *How formal exams can be avoided?*. He pointed to problems with assessment based on (1) his own particular teaching experience and (2) his personal reflections on his experiences of assessment and proposed possible alternatives/solutions to these problems. He noted that in his Department of Law the increasing numbers of students have meant that assessment can no longer be done in the form of essays but as examinations instead. This has been a move from Romantic assessment to Classic. His own personal experiences of formal examinations destroyed his faith in them. All of this shows that there is opposition to Romantic education and that again social context is important in determining whether we will be successful in implementing ideas for universities.

In this module the final one-day session focussed on reading and writing and their importance. I have used this in my practice with the readings course where the students were not only required to read, but also to write up notes summarising the sessions (see section 4.1.1 and Appendix B.3). I believe that my approach to assessment in the readings course will enable assessment of the crucial components in the way I would like. I believe this form of assessment will be more in line with what students need to know for future careers in academia (e.g. Ph.D. research) and in industry and might be better at predicting adult performance (see Gibbs 1989). Also, it seems to be the case that innovative assessment and active learning go hand in hand. I believe that this innovative type of assessment facilitates students and tutors in their thinking.

In this module we noted that Britain has more examinations than anywhere else in Europe and this is also reflected in my experience whilst coming to Denmark. Hence, some systems lean more towards Classic education whereas others lean more towards Romantic education.

With respect to the readings, Gibbs (1989) points to the fact that the traditional emphasis on grades in education leads to the ridiculous situation where A-level results fail to predict degree results and degree results fail to predict success in adult performance. Oxford and Cambridge recognise this and have low entry requirements. In fact he notes that there is a negative correlation between degree classification and success in certain professional areas. Also, Carter (1980) notes the link between the 11+ examination in Britain and the I and II(i) demarkation line for selecting students for doing Ph.D's. Gibbs gets to the crux of what I believe is the problem with traditional education - it focusses too much on assessment by traditional methods and not enough on the interactive side of assessment and that is why it fails to predict. Gibbs views have much in common with what Feynman, Schank, and Goleman say on assessment. Certainly, it is clear that

grades from Classic assessment are not a strong indicator of success in the pursuit of Romantic knowledge or survival in the real world. Also, this links to Goleman's point about emotional intelligence needing to be counted more. Jarvis (1983) also says that there needs to be more personal, social and emotional assessment of students, especially in training for professions like medicine. He questions the need at all for Classic assessment. Much of this goes back to Goleman's *emotional intelligence*. Jarvis notes that assessment can include prejudice and he says:

“They [standards] may reflect the professionalism of the marker as much as the competency of the student, but the award (sic) grades may give a spurious objectivity to a process that is largely subjective” (p. 102).

Jarvis also points to the importance of self-assessment during practice and on peer assessment. He notes that it is not good enough to do well in examinations. He discusses all sorts of problems with examinations such as research showing that exam results could not be replicated and problems with subjectivity of marking. Much of this has echoes of Schank. The form of assessment that Jarvis advocates is that by which Aalborg university students are examined on their projects through oral examination (see section 4.1.4). Hextall (1976) and O'Connor (1992) focus on the stress that examinations cause and Hextall emphasizes that marks determine the scholastic identity of pupils by themselves, their friends, teachers and parents. Again we have an attack on Classic assessment and how unproductive it can be. O'Connor's (1992) newspaper article focusses on the fact that an Oxford don (Michael Dummett, Professor of Philosophy) made the suggestion in the *Oxford Magazine* that one-off finals verged on sadism. He pointed to the stress and strain involved in doing one final set of exams which determine a student's future. O'Connor concludes however with the fact that Prof. Dummett's proposals for reform have been met with resounding silence. Again, this goes back to Schank's point on too much reliance on grades and not enough on solving problems. This problem has not been such a big problem for me at Aalborg University because any grades awarded for my course are pass/fail and all students graded, passed. Certainly, implementing ideas for universities will need to include balanced Classic/Romantic assessment.

Hextall (1976) notes that marking is done in respect of social context of the institution of employment and that markers are constantly aware of what their colleagues will think. I was certainly conscious of the fact that my innovative method of assessment in the readings course would be in the context of the institution but also an institution where this was appropriate. It would have been much more difficult to implement in many of the other institutions where I have had educational experiences (see Chapter 2). Hextall (1976) and Bates (1984) note that qualifications are used to implement hierarchies in society and impose identities in social context. Hextall's concluding point is on evaluation being about hierarchies where some people have the power to denote one person or product as superior to another. Bates' (1984) focus on the distinction between the managerial and educational aspects of school evaluation systems brings out clearly the Classic/Romantic dichotomy, the goals of each and the assessment methods each use to reinforce themselves. For many of the courses at Aalborg University, Denmark a pass/fail grade

is given whilst other courses are evaluated through project work. For projects, it is usual to give all students in the group the same grade unless there is strong evidence to the contrary. Hence, the idea is not to build hierarchies but to have everyone work together in groups to achieve goals. However, this is in the social context of Denmark's socialist democracy where it is unacceptable to think in terms of hierarchies and the concept of superiority is quashed.

Boud and Lublin (1992) point out that there is not enough self-assessment in education – students are overlooked and under-utilized. This is all very much in line with our ideas for universities and especially Romantic education where the centre of power moves away from the teacher towards the student. They point out that students have problems assessing themselves because they are more used to others assessing them. I have experienced this when two students asked me for references and I told them to write their references and I would sign them. They became very confused since this was the first time they had been asked to do this. In my practice I have not conducted any action research on self-assessment although I do consider it to be part of Romantic education.

Bates (1984) and Hextall (1976) note that qualifications are used to implement hierarchies in society and impose identities in social context. Bates notes that during times of economic expansion many people are overqualified for the jobs they hold. He also stresses the rising costs of education and the reduction in employment opportunities. This is a point which has occurred to me time and time again, where in society we are oftentimes pushed more and more towards the inflation of educational qualifications. Bates says that of the three message systems in schools: curriculum, pedagogy, and evaluation, the evaluation system is the most neglected and in need of evaluation itself. He points to the use schools and societies make of educational qualifications and that a class structure is in place where evaluation has become a mechanism for exclusion. He says the fundamental formula of the meritocracy is:  $IQ + \text{effort} = \text{merit}$ .

Bates notes that evaluation systems in schools serve several purposes: (1) feeding back information to pupils, teachers and parents, (2) serve wider purpose of social allocation, stratification and exclusion, (3) convey individual accountability which incorporates judgements of worth and blame into the consciousness of teachers, pupils, and parents, and (4) enable the development of mechanisms of hierarchical accountability and control. He notes that there are two contradictory aspects of school evaluation systems: (1) managerial and (2) educational. He says that standard, norm-referenced, summative, performance and standardized tests tend to be aligned to managerial purposes whereas formative, criterion-referenced, diagnostic and teacher-made tests serve educational purposes. Educational evaluation focusses on dialogue in the classroom and managerial evaluation is directed towards classification, discrimination and control. Managerial evaluation is concerned with sorting people out and this process is one by which existing talent in society is matched to the expanding occupational structure. Feynman, Schank, Triggler and Goleman would all agree (see Chapter 2).

### 5.3.3 Curriculum design

Again, in this module on curriculum design, as in the previous two, it was noted that the social and administrative context was extremely important in determining the success of teaching practice (see Mc Kevitt 1996a). I noted that although one can be as rational as one wants in curriculum design, with top-down models in mind, in all cases of my design experience a non-rational model was used and showed that it is the cultural, social and administrative context, emphasizes in particular Departments and even particular individuals which influence curricula and hence subjective values come into play. The new curriculum development experiences discussed in this dissertation are also very much based on these previous experiences and my views have not since changed. The curriculum design that I have been involved in at Aalborg University and the Socrates meetings (see section 4.2) has been formal and top-down. The vested interests of individuals are significant in determining what they will do with curriculum development. In the module many of writings and readings focussed on the problem that there are too many students in British universities to be creative in any way about curriculum design.

We asked whether it is possible to have a value-free curriculum design reducing the influence of racism and Ellsworth's (1989) question of assumptions we have. This relates to an issue which came up in the development of the IntelliMedia Master's curriculum where Committee members frequently referred to the fact that foreign students are typically not qualified enough and where the introductory text for an internet-based course relating to the fact foreign students typically do not have sufficient background (see section 4.2.1). Also, another issue related to value and nationality/race arose in respect of the wording of certification for the European Master's Degree in language and speech where words such as "born" and "place and country" were used (see section 4.2.2).

In this module I discussed two other examples of curriculum development practice with (1) design of the curriculum for a new M.Sc. Degree course on Language and Speech at the Department of Computer Science, University of Sheffield, and (2) attendance at two EU Erasmus meetings where we discussed a possible curriculum for a European Bachelor's Degree course in Natural Language Processing (NLP). The former experience was bottom-up in nature as compared to that of the Aalborg Master's. However, the problem of the formal curriculum not actually being met with courses given was a problem. In fact I mentioned one case where the formal curriculum said that students would not need so much computing background but one student with a linguistic background starting on the Master's found the computing to be too much. There was a problem with giving a name to the Master's degree at Sheffield due to competing vested interests but this was not a problem at Aalborg since I was employed as an expert to advise on the establishing of the Master's and hence what I said went! There were administrative problems at Sheffield which meant that some prospective students didn't get application forms and these problems were due to general overwork, chaos and stress of administrative staff. This problem does not exist at Aalborg University, Denmark. The latter experience was very similar to the experiences I have had in

the Socrates curriculum development projects (see section 4.2). The goal was to investigate the possibility of developing a pan-European Bachelor's (not Master's) degree in Natural Language Processing (NLP). There were vested interests of participants attempting to push the curriculum their way just as happened in the European Master's curriculum development. This again goes to show the importance of groupwork and dialogue in the development of curricula.

Here, we made a distinction between (1) rational and (2) non-rational curriculum development where the former is one where desired learning outcomes are prespecified and the latter where they emerge. Much of the design of the Aalborg Master's is prespecified although the Socrates meetings are more emergent. We also focussed on how the intentions of the designer shape the design of the Master's curriculum. Certainly the Aalborg Master's was designed this way but also the working group had a chance to put their views forward. One question which we asked was, "How do students figure in the curriculum design process?" and Stephen (tutor) mentioned this specifically in his writings in this module. I am sad to say that in all examples here students did not figure significantly in the curriculum design process although for my readings course I have taken on their suggestion that it should be earlier in the semester.

We noted that authority is important in curriculum design and is a question which is ducked and this can be with the lecturer or the institution. In most cases of curriculum design the authority is with the institution rather than the lecturer. Authority is responsibility + power and in my curriculum development practice the authority of institutions did play a part. In the development of the IntelliMedia Master's the authority of the university was important in accepting the proposal. With the Socrates projects we were constantly asked to contact our university authorities about what the legal status of any curriculum would be (see section 4.2).

We noted that societal trends can influence curricula and referenced for example that Jurassic Park stimulated interest in Biology. Certainly, the move towards speech and language integration (see sections 4.1 and 4.2) and multimodality in the field has meant that a new Master's degree in Intelligent MultiMedia was possible. Also, we saw in Chapter 2 that there has been a move towards interdisciplinary studies in general (see Horgan 1986).

Many participants in the module had problems with their curriculum design and I did not find this with mine. Their writings noted that it is difficult to be innovative about curriculum design because of the high student numbers in the university. I have not had such experiences but this may be because my curriculum development has been with developing new programmes rather than existing ones.

We discussed whether facts are negotiated or socially determined and this goes back to Reid (1978) and about objective rather than socially agreed truths. The difference between Classic and Romantic education is that the former focusses on the messenger providing the facts (message) whereas the latter focusses on socially negotiated information. Also, facts can change over time and especially when there are paradigm shifts (Kuhn). Reid notes that theory must ring true to practitioners and this certainly gets at the rift between Classic and Romantic education.

Most of the readings here focussed on the distinction between rational and non-rational models of curriculum design. Whilst skimming the readings it becomes clear that Hirst/Stenhouse/Reid/Barnett/Kelly are related to the question of whether we can usefully prespecify the learning outcomes from our teaching. The readings Patten/McMurtry/Herbst are related to the extent to which what and how we teach is determined by factors beyond our control. The focus is on market forces, individual choice, and politicisation of the curriculum.

Hirst (1975) argues for tighter and more specific descriptions of aims and objectives for curricula. He discusses what facts are from a philosophical point of view and says that we must define what they are if we are to teach them. He has a long discussion of what the *mind* is and how people conduct knowledge acquisition and notes that people are not just passive receptors of information. This point is made in Posner (1989) which says even more specifically that mind is coloured by culture. Like Horgan, Hirst also notes that interdisciplinary areas are in abundance now and this enables further understanding of various sub-disciplines. Hirst calls for a logical mapping of objectives for curriculum design and not just a categorization of them. I disagree with Hirst's call for a logical mapping of objectives for curriculum design. The experiences from my practice of curriculum design show the process is actually more emergent (see section 4.2).

Stenhouse (1975, Ch. 5) gives an overview of approaches to curriculum design and begins by saying that we should follow the *objectives model* which is the classical approach. The approach is to define objectives in a top-down manner from which everything will follow. There is no room for unexpected or emergent outcomes. He notes that the Swedes have objected to the objectives approach mainly found in the US and Britain in that it focusses too much on precise specification of objectives. This approach is very much in the vein of Classic education. Again, I would disagree, and all my experience with curriculum design shows up more emergence. Also, I believe the objectives model will stifle creativity in curriculum design. In another chapter (Ch. 6) Stenhouse critiques the objectives model pointing out that it does not work well for policy sciences or where theories/models are precarious. His point about teachers needing to be proactive and that education is about making people unpredictable in their creativity goes back to what I said about Romantic education stimulating creativity. He notes that true education aims for and leads to unpredictable outcomes and this is why politicians want to eradicate it. This is exactly why many see Romantic education as a threat. Stenhouse says that it is the creative, individual thinking, unpredictable, original and surprising students who get graded with firsts which Schank, Goleman and I would disagree with. Reid (1978) stresses that curriculum design is about practice, that it calls for spontaneous reaction but that this should not require a conflict between theory and practice. He notes that the nature of practice is determined by personal attitudes, values and emotions. Reid's links to the personal and emotional side of intelligence brings us back to Pirsig and Goleman. All of the latter become more useful with Romantic education. With respect to the main idea then Reid's attack on the rational definitely supports Romantic education and its emergent possibilities.

Barnett (1990, Ch. 3) notes that philosophers like Popper believe scientific knowledge to be supreme whereas others like Kuhn and Feyerabend see science as less linear and coherent and see its shortcomings from a rationalist perspective. Barnett's framework for knowledge based on five ingredients defines exactly what our ideas for universities are. Barnett's stress on the importance of the humanistic as well as the scientific matches how I have included humanistic elements in the IntelliMedia Master's at Aalborg. In fact one student (Pernille) just came to me during the final semester and said she liked the inclusion of the humanistic elements in the readings course (see section 4.1.1). Barnett (1990, Ch. 4) focusses on the nature of knowledge and belief and that facts are agreed beliefs. He attacks those like Popper and Kuhn who think that objectivity can be obtained by formal methods and logical criteria such as refutation. He goes beyond objectivity and proposes that *subjectivity* may also be necessary, even in extreme forms. Without subjectivity I would never have thought of integrating language and vision processing or even setting up a Master's education in IntelliMedia. Barnett quotes Wittgenstein: "Are the different forms of knowledge just so many language games,.." (p. 41) and I believe such language games appear in everyday practice including curriculum design. Barnett notes that there is not much room for the role of the student in discussions about truth and he thinks that they should become more independent and active. He concludes by saying that truth is negotiated and that the student must be an active participant in learning. Much of Barnett's discussion falls in line with more dialectic approaches to education involving groupwork in the vein of Pirsig, Feynman, Schank, and Kjærdsdam and Enemark. These points again link to my ideas and the importance of Romantic education.

Kelly (1989) refers to the amount of change that has occurred in the education system and the degree of social change which has occurred. He asks questions about who wields power and where teachers are concerned with a triangle of interests. He notes in the UK there is a government which doesn't care much. Kelly's article gets at the truth of problems related to how difficult it is to design creative new curricula in light of the UK government's attitude towards education. He points to the difficulty of designing curricula in light of the current UK government's attitude towards education. Certainly, I would have found it difficult to establish the Master's in IntelliMedia education in England because its very existence would be based on student numbers and there are many universities competing for these numbers. Also, at Aalborg the University committed itself to funding the Master's course for two years in any case even if there were not high student numbers. Also, the Master's involved bringing three Departments together and this would have been very difficult in the competitive environment created by the UK government. Kelly notes that the official curriculum and the actual curriculum may differ and that differences may occur due to intentions to deceive so that what is offered appears more attractive than what it really is. He points to the serious mismatch in the UK with respect to the National Curriculum for schools. I have also noticed this in my curriculum design practice and also with the Master's in IntelliMedia at Aalborg which is actually taught in a given year differs from the formal curriculum (see section

4.2.1). The differences are due to difficulties in certain courses not being offered during certain semesters or years due to teachers leaving and new ones coming. Also, new courses which were promised to be developed were never completed (e.g. statistics and signal processing) or offered as web-based courses.

Patten (1993) focusses on the need for modularisation of degree courses for more flexibility and I see that as a positive venture. He says that the enormous expansion of higher education does not mean mass-production in a factory like way. I totally disagree with this and all my experiences have been that higher education in England has been turned into exactly that. Patten attacks the idea of longer degree courses but we decided with the Master's in IntelliMedia that it should be 1 and 1/2 years long (as it is in most countries) as it is difficult to complete the courses and a thesis in one year. We also noted the possible reduction in standards when one tries to crush a 1 and 1/2 year Master's into 1 year.

McMurtry (1991), like Triggle (1998), focusses on the underlying tension between principles of the market and those of education and how much today's universities have become like businesses. This point was also made by Kelly. He quotes the Chairman of Bell-Northern Research Ltd. who says that "...85% of university research isn't worth reading.." (p. 210). He also points out that similar statements are coming from university leaders the world over and cites a Canadian example. He notes that over two-thirds of the school-text market in North America is controlled by just eight multinationals and academic teachers in the USA and Canada are categorised as *business persons* who function as *providers of goods and services*. Again, McMurtry agrees with Triggle. This is not such a problem in Denmark which is the highest investor in education per capita in Europe and where the government funds universities heavily. Herbst (1973) wants education to be production of products and he sees education as work rather than labour. But, he also points out that education should not be about training people for working in industry, for then students become labourers rather than workers. For me, Classic education sees students as labourers whereas Romantic education does not.

Freire (1972) notes, like many we have read during the course, that analysis of the teacher-student relationship is fundamentally *narrative* in character. He says that when educational content is *narrated* it becomes lifeless and petrified and that is happening with education today. He talks of students becoming containers where information is deposited and the *banking concept* of education where the scope of action is receiving, filing and storing of deposits. He says if we are truly committed we must reject the banking model of education and adopt instead a concept of men as conscious beings with consciousness directed towards the world — the problem-solving model. He says the essence of consciousness is *intentionality* which embodies communication and rejects *communiqués*. The banking model involves *submersion* of consciousness whereas the problem-solving model strives for *emergence* of consciousness. He points out that banking education inhibits creativity and domesticates the intentionality of consciousness by isolating it from the world and depriving students of their ontological and historical vocation. Freire's ideas have much

in common with Feynman, Schank, Kjærdsdam and Enemark's especially with respect to problem-based education. His banking-model of education characterises very well the Classic approach. On the Romantic side, I like very much Freire's idea of a problem-solving model of education where he encourages emergence which follows very well our ideas for universities. Lyotard (1992) focusses on the education of teachers as well as students which is a goal of Romantic education where the messenger and message become confused. My readings course gives the students as well as the teachers as much a chance to present and here the teachers as well as the students can learn. His points to the changing world which relies on speed, satisfaction, narcissism, competitiveness, success and fulfilment and its difference with philosophy basically distinguishing qualities of Classic and Romantic education.

Rowland (1981) (tutor) discusses the problem of intervening in the learning process and the problem is that when one intervenes at the wrong time one may tamper with a positive learning phenomenon. Stephen makes some very useful observations while watching a particular student called Dean. Dean is looking at caterpillars and working out how to categorise them. He seems to be categorising them with redundancy in the tables he writes up and Stephen intervenes but Dean is insistent and the next day it becomes apparent that Dean has another more abstract reason for the structure of his tables. Also, in learning how to weigh the caterpillars Dean comes across a maths problem in fractions and solves it and when Stephen suggested he might do some fractions in a maths book Dean had no problem with this. In fact, Dean took out a higher level book than he was currently on and started working on the problems in that and Stephen didn't intervene! Pirsig, Feynman, Schank, Triggle, and Goleman would all approve of what Stephen did. This problem also came up during my readings course (see section 4.1.1) where I had to decide when to intervene in the student and invited guest lecturer presentations when they would make what I thought were errors, or where I wanted to make a comment or addition to what was being said. In most cases when I intervened it was for positive reasons so I intervened lots. I also invited the students to intervene as much as possible. This intervention problem arises more with Romantic education where there is dialogue and hence I feel it is a good thing that the problem exists at all.

#### 5.3.4 Active learning

Active learning is about trying out and evaluating different approaches to teaching and development innovations which gives students greater control over their learning (see Mc Kevitt 1996b). Themes of active learning were identified as: (1) significance of prior learning, (2) responsibility for learning, (3) strategies for active learning, (4) empowerment and coercion, and (5) reflection as an active process. An issue which kept cropping up was that active learning is hard to define and this is the central point of Rowland (undated) (tutor).

During our discussions people made remarks which struck me. Jon (tutor) said that he felt equal among learners and not at a higher level of tutor. Richard noted that active learning is an *attitude of mind* and does not imply the need for overt activity. The tutor is to act as a *facilitator*

initiating and maintaining a group dynamic. Eileen noted that the role of the tutor is to strike a balance between authority and student autonomy. All of these views concur with the strategy I took in the readings course (see section 4.1.1) and also during my direction of IntelliMedia 2000+ research (see section 4.1.2) and project supervision (see section 4.1.4).

One of my reflections in this module was that a deadlock situation will occur if the student doesn't become active and that sometimes it is difficult to encourage the student to become active. Stephen (tutor) noted in his writings that the crux problem of active learning is *uncertainty*. However, I see this as the magic essence of Romantic education. However, we agreed that the tutor needs to make it clear when active learning is happening which is what I did.

Other points which came up were that some students do not like active learning; they want to be spoon fed; some people do not want to take responsibility. Also, I agree with Wendy that groupwork facilitates active learning and I think they are tightly linked. My practice shows that active learning may be suited more to some students and projects than others.

Gerry noted that it is the social context (surprise, surprise!) which determines the success of active learning and the focus on assessment discourages much active learning. This point about the strong link between assessment and active learning came up in the previous section. Gerry notes that Medical students are so afraid of making mistakes, of hurting patients and being humiliated that they rarely experiment. I think this ego factor and saving face also gets at a crux of active learning. He noted that the system we are in does not encourage active learning and that institutions can go against the possibility.

Unlike for the previous modules we did not have a set of papers given as readings. We were given a paper by Stephen (tutor) (see Rowland undated) and also a collection of papers in a booklet edited by Entwistle (1992). This reduction in the readings might have been part of the active learning process where maybe we were to be more active in finding our own readings?

I noted that Stephen (see Rowland undated) started off his paper in a booklet by using *forward* rather than *foreword* for the foreword, or forward. Also, I noted is that there is no date on the booklet — i.e. it is undated!! I liked the inclusive approach taken where two who didn't want to participate in a collaborative drawing exercise were not rejected. Stephen took what would normally be considered an approach very lenient on assessment. Students could choose to (1) submit work to him for assessment, (2) assess their own work, or (3) not submit anything at all. All of these approaches would be considered reasonable. I enjoyed very much the style of Stephen's booklet which incorporates personal experiences and this is something we get very little of in scientific publications. My own academic research is leading very much towards considering the importance of subjectivity and the self in science and studies of the mind (see Ó Nualláin et al. 1996). The booklet ends with a powerful statement from Ray where he ends on a questioning note on the subject of active learning. Stephen's open and creative approach to assessment would be approved by Feynman, Schank, Pirsig, Goleman, Trigg and others. Stephen focusses on the fact that active learning is hard to define and he related an experience where people were unsure

about it and he had to write a letter of reassurance. I also found the same with my readings course (see section 4.1.1) where I had to reassure the students over email about what exactly they had to do and what was needed to fulfill assessment requirements.

Entwistle (1992) points out that employers and the business world have been concerned about the lack of relevance of content in degrees to the real working world. They are also concerned about students inability to function in the social workplace and to work in groups. I liked his emphasis on computing and that he noticed the move towards more multimedia computing has enabled students to use and learn from computers better. Kjærdsdam and Enemark's argument for groupwork and problem-based learning would solve the problems Entwistle brings up here. I believe these concerns are valid and due to too much Classic education and not enough Romantic education.

## 5.4 Recommendations and future work

Now that we have covered how ideas for universities relate to others' views, I wish to make some recommendations as to how they can be implemented in universities:

- groupwork and project-based education
- alternative means of assessment, e.g. oral assessment
- alternative means of teaching, e.g. active learning
- the use of the internet for active learning, e.g. literature search
- Computer Aided Learning (CAL) and internet-based teaching, e.g. software packages for teaching speech/language processing
- increase links between education and research, e.g. education arenas at research conferences, studytrips for students
- interdisciplinary links bridging gaps, e.g. links between Humanities and Science/ Engineering, e.g. pan-departmental degrees
- lifelong learning for students and staff
- more links to industry for student project placements
- study placements abroad, e.g. for pan-European degrees
- focus on education and not business
- focus on research and not counting publications
- focus on students and not student numbers

I will continue to implement ideas for universities in my research, teaching and curriculum development as much as possible and will continue to also encourage others to do so. In particular I will do this at the institution(s) where I am employed but also when I am at national and international meetings where education is being discussed (and even where it is not!). These meetings will occur during the course of EU (mainly Socrates/Tempus) and other projects I am involved in.

Over the past six years my education agenda has been to focus on the integration of language and vision processing and my teaching, research and curriculum development has been geared towards that. Next, I would like to focus on the integration of natural and formal language processing. Something else which I have always been interested in is integrating the Arts/Humanities and Sciences/Engineering (see Mc Kevitt 1998a,b) as was pointed out in my discussion of the readings course (see section 4.1.1). In fact I have been programme chair for a conference on *language, vision & music* held in Galway, Ireland, August, 1999 (see Appendix C). I would like to do further work in this area and I firmly believe that my ideas for universities will be crucial in all these endeavours.

One project on which I wish to follow up is where a visitor came to Aalborg University from the University of Transilvania, Brasov in Romania and he is now attempting to implement the Aalborg style within Brasov on at least one course he teaches. Romania has an extreme Classic means of education (see section 4.2.5) and so that particular project will be of interest for me.

One problem encountered with implementing Romantic education is that it costs more. Ideally, one should provide rooms within the university which groups can inhabit and work in. Also, it costs more to set up and administer all the group oral examinations. There are problems with students who find it difficult to work in groups - which does happen! Also, what about lazy students who hide in groups and do little or no work but still obtain the same grades? This does happen! Future work will involve developing means to minimise these problems.

It is clear that the right cultural and social context must be provided in order to achieve implementation of ideas for universities. Triggler pointed out that in order to do this we must return to heterarchical structures of management (Guilds), must focus more on lifelong learning and encourage interdisciplinary studies bringing the Humanities and Sciences/Engineering closer. These are clear goals which will provide a launching pad for ideas for universities.

## 5.5 Conclusion

Here, I conclude that my ideas for universities which focus on the integration of Classic and Romantic education are beneficial for the future of education. This conclusion is based on the evidence I have presented on the success I have had with implementing the ideas in practice. Although these ideas were brewing from earlier years the M.Ed. course at the University of Sheffield, England and Aalborg University, Denmark with its unique Aalborg style of education

have been influential in reinforcing them. It is concluded that more universities need to take on these ideas and implement them. This will not be easy since there will be opposition from those who see themselves as keepers of messages. But that makes the challenge all the more exciting in stressing education which is not only Classic but also Romantic.



# Appendix A

## Views on academic management

Here we include views on academic management from four letters to the “Irish Times” newspaper in reaction to the controversial restructuring plan for The Queen’s University of Belfast, Northern Ireland and from Prof. Roger Downer, the new President (Vice Chancellor/Rektor) of the University of Limerick, Ireland.

### A.1 Letters on dismissals at Queen’s

Here we have four letters to the Editor from the “Irish Times” newspaper (obtained from the WWW) in reaction to the controversial restructuring plan for The Queen’s University of Belfast, Northern Ireland by Prof. George Bain, its new President (Vice Chancellor/Rektor) where 107 academic staff have been targeted for early retirement based on expected contribution to the Research Assessment Exercise (RAE 2001).

#### A.1.1 Monsignor Denis Faul

[The Irish Times] [Image]

LETTERS . [Previous Edition] Saturday,  
September 5, 1998 [Next Edition]  
[Image]

[Image]

DISMISSALS AT QUEEN’S

Sir, - I feel compelled to continue to express my interest and anxiety about the Queen’s University Belfast proposals to dismiss 107 lecturers and to close down four faculties, namely Italian, Hebrew, Statistics and Geology. I consider these proposals unjust and cruel.

In my 40 years’ experience in grammar school teaching I have appreciated very much the teaching skills and the human and pastoral interest of the staff of Queen’s University for the students that we and the parents sent to them. To us as teachers, and to the parents, the teaching and human interest in the students

are much more important qualities than research work which, important as it may be, is of interest to post-graduate people.

We feel very grateful that the staff at QUB have put the intellectual development of their pupils, and their social and human problems as students in first place, and have devoted their time to the young persons passing through the university each year. I am sorry that many lecturers in Queens are now going to be penalised for putting the development and care of the students as their top priorities.

I have grave doubts also about the way in which the research assessment body works. I do not think it is fair or comprehensive; it missed much research work by the 107 lecturers, which is complete and pending publication. I know that there must be many other people in Northern Ireland and elsewhere who are equally concerned about the treatment proposed for the 107 dedicated lecturers.

I suggest that these "Concerned Friends of the Queen's University of Belfast" should get together by sending their names and expressions of interest to some of the 107 lecturers or 125 signatories of the letter of protest August 29th, who have served them and their children well, or to myself or to members of the Senate. I would like these people to speak up and express their views on this very important matter which is indeed a crisis for the very worthy and unique approach to students which the Queen's University has shown over many years. - Yours, etc.,  
Rt Rev Monsignor DENIS FAUL, PP Carrickmore,  
Retired Headmaster, St Patrick's Boys Academy,  
Dungannon, Carrickmore, Co Tyrone.

### A.1.2 Dr. Paul Clifford

[The Irish Times] [Image]

LETTERS . [Previous Edition]Friday,  
September 25, 1998 [Next Edition]  
[Image]

DISMISSALS AT QUEEN'S

Sir, - It was reported in your newspaper that the vice-chancellor of Queen's University Belfast, Prof George Bain, is adamant that 80

per cent of Queen's staff support his restructuring plan (Education & Living, September 15th).

Almost every non-targeted person that I know in Queen's is against the plan, but is afraid, for a variety of reasons, to say so in public. I suggest that Prof Bain poll the academic staff by secret ballot to find out just how many support him. He might well be surprised.

It is also important that university academics in "the South" understand fully what the plan at Queen's is about. The targeting of 107 academic staff for early retirement/severance has been based totally on their expected contribution to RAE 2001. I use the word "totally" with care, in contrast to a member of the senior management team at Queen's who quite wrongly substituted "largely" when interviewed for the RT Radio 1 programme This Week, broadcast on September 6th. Let me clarify: RAE stands for Research Assessment Exercise. Five is the highest and one the lowest, and the school to which I belong was rated RAE3a in the last exercise. I have been targeted and judged as "research inactive" because I cannot reach RAE4 or above. There is little or no chance that you will be judged as RAE4 or above unless your research attracts significant external income. A consistent publication record is not enough.

In my 24 years at Queen's, I have produced 34 research papers, most of which are in good international journals, and 18 teaching papers in journals such as Journal of Biological Education and American Biology Teacher. My research receives international respect and I continue to do research despite the limited facilities provided by Queen's. My acknowledged contribution to the teaching of plant science at Queen's is seemingly not valued. Can Prof Bain continue with the pretext that he is aiming for "balanced excellence" at Queen's? It looks more like he has decided that the RAE alone should set the agenda for the future of Queen's. The plan for restructuring at Queen's is doomed to failure. Those targeted will not be easily replaced and considerable damage has already been done to morale. I remain committed to my subject area, my students in the coming year and my principles concerning what universities should be. - Yours, etc.,

Dr PAUL CLIFFORD, Lecturer, School of Biology  
and Biochemistry, Queen's University Belfast.

### A.1.3 Paul J. Cannon

[The Irish Times] [Image]

LETTERS . [Previous Edition]Wednesday,  
October 21, 1998 [Next Edition]  
[Image]

#### DISMISSALS AT QUEEN'S

Sir, - Decimation of any UK or Irish  
university's full-time academic staff can have  
international repercussions.

Seemingly no QUB convocation meeting -  
extraordinary, general or otherwise - has yet  
been convened to debate the issue raised in  
your columns. QUB and NUI convocations are  
authorities (sic), whose prescribed roles  
include (1) examination of any significant  
university problem and (2) election of a  
substantial fraction of the top academic  
executive body. Queen's convocation did not  
lack vitality in recent years, to judge by  
dramatic meetings on, for example,  
discrimination. This makes the present silence  
all the more deafening.

Has no graduate appealed to the Visitor (the  
British Crown) to act through hearings before  
its visitorial board (composed, I believe, of  
distinguished lawyers, four in number because  
genderbalanced)?

What about a university ombudsman? A single  
ombudsman, appointed exclusively by a  
university, could, I submit, conflict with the  
spirit of the QUB and NUI founding charters and  
with the principle of internal autonomy, a  
thesis eloquently developed by Prof Joe Lee in  
the last stage of the recent Bill debated in  
Seanad ireann in respect of notably NUI's  
future.

Transparency, equity and quality assurance  
entitle graduates and staff to know what  
criteria are applied to redundancy  
recommendations. Were the same criteria applied  
to all QUB faculties? Were the  
research-inactive given advance warning in

reasonable time? If one-fifth, say, of the students are postgraduate, much of a lecturer's teaching may be supervisory, thus necessarily researchproductive. If the teaching workload is excessive, in terms, for example, of contact hours, research may be impossible. Were some QUB academics caught in this trap?

Events north and south of the Border now suggest that the Republic's present Government, in a manner consistent with the recent legislation and in accordance with pre-electoral Fianna Fil declarations, should establish as soon as possible a Visitorial Board for NUI academics and (as at TCD) for students. The QUB experience calls for general vigilance. - Yours, etc.,  
PAUL J. CANNON (Professor Emeritus), Camowen, Marlborough Road, Glenageary, Co Dublin.

#### A.1.4 Sean D. Barrett

[The Irish Times] [Image]

LETTERS . [Previous Edition] Thursday,  
October 22, 1998 [Next Edition]  
[Image]

#### DISMISSALS AT QUEEN'S

Sir, - In her examination of the controversial measuring exercises of the vice-chancellor of Queen's University, your reporter Yvonne Healy wrote: "It's all tough and challenging stuff and prompts the question will universities in the Republic have the courage to display such openness and clear thinking" (Education & Living, September 15th). I support the subsequent contributions on these pages from Dr William Reville, Prof Edna Longley and Mr John Clarke on the considerable problems caused by such exercises. They should not be adopted here. Universities in the Republic produce world-class graduates at about half the UK cost. They do so without the encumbrance of a British system which is based on Thatcherism, neglects students, demoralises staff, destroys the community of learning and produces paper mountains measuring what cannot be measured. It is dominated by bureaucrats who don't teach, don't meet students and don't do research, but are assumed to be experts in each of these.

Laurie Taylor describes the UK system in the Times Higher Education Supplement of October 2nd in the words of an "esteemed vice chancellor":

"We've had a number of notable successes. We managed to hire 12 leading research mercenaries in time for the last assessment and were rewarded with increased ratings for nine departments. We also anticipated the new emphasis on first-class degrees and successfully raised the number we are awarding by 22 per cent as a result of our systematic policy of recruiting under-qualified and compliant external examiners. These strategies alone lifted Popton University five places in the Times league table."

Taylor's research mercenaries will have very large salaries. Shorn of its outdated managerialist jargon, the exercise is the means by which a very small number of university staff award themselves very large salaries at the expense of their colleagues and taxpayers. Such high earners could not possibly be expected to mingle with students. They will leave undergraduate teaching to junior staff.

Some university staff hope to become very wealthy from the UK system. The majority, I believe, loathe it. They do not speak out, as Dr Reville requests, because the managerial university is a controlled society which punishes dissidents. The loss of the university as a liberal voice in society and the dumbing down of undergraduate teaching are among the many costs of the UK system which are not considered by the beancounters.

The system has a life of its own because many senior university officers do little or no research or teaching but live in the quango interface between politicians and bureaucrats. In that company disparaging remarks about ivory towers are commonplace. Senior university figures in the Republic fell over themselves to support the statist educational policies of the last government long after the dogs in the streets knew that those very policies would propel that government out of office. I hope that our universities will learn from that experience and that this Government will reverse the mistakes of its predecessor.

Universities in the Republic should decline Prof Bain's invitation to emulate him but make a counter offer. When the shallowness of current British policy towards higher education becomes even more obvious, we should offer to assist in the restoration of universities in the United Kingdom as communities of scholars run on collegiate rather than on outdated managerialist lines. - Yours, etc.,  
SEAN D. BARRETT, FTCD, Trinity College, Dublin  
2.

## A.2 Prof. Roger Downer's inaugural

Here we have a newspaper article from the "Irish Times" Newspaper (obtained from the WWW) on Prof. Roger Downer's inaugural address as the new President (Vice Chancellor/Rektor) of the University of Limerick, Ireland. I like his emphasis on the "village pub" intellectual equivalent for universities.

[The Irish Times] [Image]

IRELAND                      Wednesday, September 16, 1998  
[Image]

Universities should be like  
'village pub' intellectually

-----  
By Arthur Quinlan, in Limerick

"Rather than an elitist and remote ivory tower, I would like the university to serve as an intellectual equivalent of the village pub. A place where people gather to discuss and explore ideas, discover new truths and insights and from which new and creative ideas flow out into the community to enrich and enhance the world in which we live."

This was the idea of a university expressed yesterday by Prof Roger G.H. Downer (55), a biologist, when he was inaugurated as president of the University of Limerick by the chancellor, Dr Miriam Hederman-O'Brien.

Prof Downer said universities were never more important because of "a new economic revolution". This revolution was likely to have as great an impact as the agrarian or industrial revolutions.

The world's richest person was Mr Bill Gates, the CEO of Microsoft, "who is at the vanguard of this new economic revolution - the knowledge revolution . . ." Universities were to the new economy what oil wells were to previous economies.

Born in Belfast, he obtained his B Sc and M Sc at Queen's University, before moving to Canada, where he completed a Ph D at the University of Western Ontario. Most of his academic career was spent at the University of Waterloo, Canada. In 1996, he became president of the Asian Institute of Technology, Thailand.

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Contact: itwired@irish-times.com

## Appendix B

# Course on “Readings in Intelligent MultiMedia”

This appendix gives the general menu description for the 5 MiniModule (MM) course on “Readings in Intelligent MultiMedia”, the student formal evaluation of the course, an example of a student’s minutes and the announcement for a MultiModality Summer School in which this course also appeared.

### B.1 Menu description

#### Readings in Intelligent MultiMedia (IntelliMedia) (Course: S9-811)

**Period:** II  
**Lecturer:** Paul Mc Kevitt  
**Students:** E-sektor: S9/S7 + F-sektor: S7

**Time:** Friday afternoon (12.30-2.15)  
**Room:** B2-109

MINIMODULE	DATE	TOPIC
MM-1	16/10	Introduction (Srihari/Maybury/Stock)
MM-2	23/10	Spatial Relations (Olivier/Siskind)
MM-3	30/10	Multimedia Generation (Hovy/André)
MM-4	6/11	Theory and Philosophy (Marconi/Wilks/Schank)

MM-5                      13/11                      Multimodal Interfaces  
(Okada/Waibel)

This is an advanced readings course and hence all readings for a given MiniModule are to be read beforehand so that they can be discussed.

Each week a student group will be responsible for giving a short presentation on their project and the respective set of papers (active learning) and then we'll all discuss them.

**Group leaders must collect papers from Inge Lis Wollesen (A6-111; ilw@kom) and Helle Andersen (E2-101; helle@cs).**

Vi ses,  
Slan Libh,  
Best,

Paul Mc Kevitt (pmck@cpk.auc.dk)  
WWW: <http://www.cpk.auc.dk/mmui/>

## B.2 Student evaluations

Here we provide all the formal student evaluations of the course “Readings in IntelliMedia” which were given to me. Only three groups out of a possible eight seemed to have filled out the forms. For one group/person it was not relevant since he was on a semester abroad and one other group told me they didn’t fill out their forms. I don’t know what happened the other three groups but it seems that students neglect to return their evaluations frequently.

**Study Board, E sector****Evaluation of course**

At the end of the course we ask each project group to fill in this evaluation form with the sum total of group members in each category for all questions asked. Please return this form to the the semester secretary.

Semester	S9-IMM	Year	1998
Title of the course	Readings in Intelligent Multimedia	Theoretical course (SE) Project-related course (PE)	PE
Course lecturer	Paul Mc Kevitt	Number of modules	1
Name of lecturer's assistant		Group no.	973

Participation in course	100-75%	74-50%	49-25%	24-0%
Number of students attending the lectures in x% of the time		X		
Number of students attending problem solving in x% of the time				

Questions		Judgement (no. of group members in each category)				
		1	2	3	4*	5*
1	Is the purpose of the course reached compared to the description of the course		✓			
2	The professional level of the course		X			
3	Has your background been sufficient			X		
4	Is the priority of subjects reasonable			X		
5	Are the subjects the same as in other courses	No: X		Yes: Which ones? ->		
6	Do you lack other subjects in this course	No: X		Yes: Which ones? ->		
7	Work load compared to the reserved consumption of time			X		
8	The quality of the obtained knowledge	X				
9	Evaluate the lecturer's ability to present the subject			X		
10	Is the lecturer well prepared		X			
11	The lecturer's involvement		X			
12	The quality of the educational material			X		
13	The suitability of the problems/tasks			X		
14	The lecturer's role during problem solving					
15	The role of the lecturer's assistant during problem solving					

Only PE	The relevance of the course to the project unit	X				
---------	---	---	--	--	--	--

Only SE	How did you find the examination					
---------	----------------------------------	--	--	--	--	--

\*)The evaluation in these two categories needs further comments!!

Judgements: 1. Very satisfactory 2. Above average 3. Average 4. Below average 5. Very unsatisfactory



**Study Board, E sector**

**Evaluation of course**

At the end of the course we ask each project group to fill in this evaluation form with the sum total of group members in each category for all questions asked. Please return this form to the the semester secretary.

Semester	S9-IMM	Year	1998
Title of the course	Readings in Intelligent Multimedia	Theoretical course (SE) Project-related course (PE)	PE
Course lecturer	Paul Mc Kevitt	Number of modules	1
Name of lecturer's assistant		Group no.	1074

<b>Participation in course</b>	100-75%	74-50%	49-25%	24-0%
Number of students attending the lectures in x% of the time	3			
Number of students attending problem solving in x% of the time	3			

Questions		Judgement (no. of group members in each category)				
		1	2	3	4*	5*
1	Is the purpose of the course reached compared to the description of the course	3				
2	The professional level of the course	3				
3	Has your background been sufficient		3			
4	Is the priority of subjects reasonable	3				
5	Are the subjects the same as in other courses	No: X	Yes: Which ones? ->			
6	Do you lack other subjects in this course	No: X	Yes: Which ones? ->			
7	Work load compared to the reserved consumption of time		3			
8	The quality of the obtained knowledge	3				
9	Evaluate the lecturer's ability to present the subject		3			
10	Is the lecturer well prepared	3				
11	The lecturer's involvement	3				
12	The quality of the educational material		3			
13	The suitability of the problems/tasks		3			
14	The lecturer's role during problem solving <i>No probs</i>	<del>_____</del>				
15	The role of the lecturer's assistant during problem solving	<del>_____</del>				

<b>Only PE</b>	The relevance of the course to the project unit	3				
----------------	---	---	--	--	--	--

<b>Only SE</b>	How did you find the examination					
----------------	----------------------------------	--	--	--	--	--

**\*)The evaluation in these two categories needs further comments!!**

- Judgements: 1. Very satisfactory      3. Average      5. Very unsatisfactory  
 2. Above average      4. Below average



**Study Board, E sector****Evaluation of course**

At the end of the course we ask each project group to fill in this evaluation form with the sum total of group members in each category for all questions asked. Please return this form to the the semester secretary.

Semester	S9-IMM	Year	1998
Title of the course	Readings in Intelligent Multimedia	Theoretical course (SE) Project-related course (PE)	PE
Course lecturer	Paul Mc Kevitt	Number of modules	1
Name of lecturer's assistant		Group no.	1077

Participation in course	100-75%	74-50%	49-25%	24-0%
Number of students attending the lectures in x% of the time				
Number of students attending problem solving in x% of the time				

Questions		Judgement (no. of group members in each category)				
		1	2	3	4*	5*
1	Is the purpose of the course reached compared to the description of the course					
2	The professional level of the course					
3	Has your background been sufficient					
4	Is the priority of subjects reasonable					
5	Are the subjects the same as in other courses	No: X		Yes: Which ones? ->		
6	Do you lack other subjects in this course	No: X		Yes: Which ones? ->		
7	Work load compared to the reserved consumption of time					
8	The quality of the obtained knowledge					
9	Evaluate the lecturer's ability to present the subject					
10	Is the lecturer well prepared					
11	The lecturer's involvement					
12	The quality of the educational material					
13	The suitability of the problems/tasks					
14	The lecturer's role during problem solving					
15	The role of the lecturer's assistant during problem solving					

<b>Only PE</b>	The relevance of the course to the project unit					
----------------	---	--	--	--	--	--

<b>Only SE</b>	How did you find the examination					
----------------	----------------------------------	--	--	--	--	--

**\*)The evaluation in these two categories needs further comments!!**

Judgements: 1. Very satisfactory      3. Average      5. Very unsatisfactory  
2. Above average      4. Below average

**SUPPLEMENTARY COMMENTS:**

Kuiesel burde placeres i 1-periode, da det giver et godt fundament og mange ideer til videre arbejde.

## B.3 Sample student minutes

This is an example of a student's minutes for the course on Readings in Intelligent Multimedia.

Resume for MM2 in Intelligent Multimedia

MM2 was held on the 23rd of October 1998

Paul Mc Kevitt and Thessa Lindof

-----  
Articles:

- \* Naoyuki Okada (1996), 'Integrating vision, motion and language through mind'.
- \* Alex Waibel et al. (1996), 'Multimodal interfaces'.

-----  
Summary of the two articles:

'Integrating vision, motion and language through mind'

The idea is to simulate the behavior of a young boy having emotions, desire, plans and performing consecutive actions. The main idea is to build a "Computer Model of Mind" where Okada assumes that the language is the essential function "to describe any data or processing in any domain". For Okada all that the human can receive as information from different media has a syntax and semantic, which is used in the implemented model Aesopworld to describe how emotions and intelligence are working.

All events in the brain model are chained actions consequences of what has been seen analyzed through vision, hearing and other feelings. All this emotions or actions are controlled by a planing module which evaluates if it is possible to perform an action or not from the actual knowledge.

In this article Okada wants the reader to agree on the fact that everything in the brain is language with syntax and semantics. But this vision seems strange for me, because I think humans are able to perform action they never learned before. How then "imagination" would be integrated in such a model ?

'Multimodal interfaces'

The article is a survey of what has been done in the INTERACT project. Through different projects, the article explains that combining modalities is a gain in robustness of recognition process. There are some given examples like "Lip reading+Sound Processing" and On-Line cursive handwriting recognition where the pen movements are analyzed and combined with the bitmap of the writing. The article gives detailed tables of the results.

Even if it seems obvious that having two different sources of information

leads to better recognition, this article has the advantage to show results of the implementation of this idea and that results really are significant.

-----  
Project presentation :

"3DK Project"

I presented the 3DK project, which is an implementation of a full 3D desktop based on the concept of Metaphors to real world.

Today's computers are fast enough to compute high quality 3D graphics but since people moved from the command prompt to graphical interfaces no real improvements have been made in this domain.

The aim of the project is to present data to the user in a familiar way, if somebody wants to hear music then he/she just clicks on the virtual 3D stereo, if somebody wants to write a letter he/she just clicks on a sheet of paper on the 3D desk.

The objects in the 3D world could have additional functions than to link to a program by the possibility of implementing plugins. A speech synthesis possibility for the objects will be implemented to demonstrate this feature.

Relation to IntelliMedia 2000+/My Project

The inside idea of the CHAMELEON project and the 3DK project is the same : "Present data and knowledge to the user through different modalities". The modalities used in CHAMELEON are speech, gesture and pointing , the main modalities used for 3DK will be 3D graphics and speech processing.

As HCI both CHAMELEON and 3DK will present data through different modalities which should lead to better recognition for the final user like mentioned by Waibel. This two applications are example that Intelligent Multimedia is needed as a means of accessing Multimedia data.

-----  
Other Project presentation :

"Intelligent browser"

The group 1074 made a presentation about their project "Intelligent browser." the goal was there to build an internet assistant with automated research, macro and so on. The idea is that when people go on the web they often do the same tasks, like browsing the same site. The idea of the intelligent browser is to record user activities and then for example predownload the habitual browsed sites.

-----  
Guest Lecturer

Thessa Lindof

During this IMM lecture there has been a presentation of Ramon Lull by Thessa Lindof a famous Spanish scientist of the 13th century (1232-1316) who wanted to find through different religions the language of God. His works have led to the construction of sentences using word assembling machines. This presentation took place in IMM lecture because many of the fundamental in artificial intelligence have an ancient heritage. Lull advanced that non mathematical reasoning can be done by a mechanical process that does not process by syllogism but combinatorics.

## B.4 MultiModality Summer School

Included here is the First announcement for the 7th European Summer School on language and speech communication to be held at Stockholm, Sweden, July, 1999.

7TH EUROPEAN SUMMER SCHOOL ON LANGUAGE AND SPEECH COMMUNICATION

\*\*\*\*\*

First Announcement

MULTIMODALITY IN LANGUAGE AND SPEECH SYSTEMS

(MiLaSS)

Stockholm, Sweden

12-23 July 1999

Organized by the Department of Speech Music and Hearing at Kungliga Tekniska Hgskolan (KTH) in Stockholm, Sweden.

The European Summer School on Language and Speech Communication has become one of the most successful annual training courses in Europe. The target audience of the Summer School are advanced undergraduate students, PhD students, postdocs and academic and industrial researchers and developers.

The topic selected for 1999 is Multimodality in Language and Speech Systems. Multimodality will be covered in a multitude of aspects. Conditions and theories for multimodal communication between persons as well as multimodal input/output in technical systems are included in the curriculum.

PROGRAMME

=====

The programme will have the following outline: The summer school starts every morning with a plenary session addressed to the integration of language and speech. Following the plenary session, there are two slots of optional courses and practical workshops, run in parallel. In the evenings, the students are given opportunity to pre-present and discuss their own projects.

Courses include:

- Integration of visual and auditory information in talking faces.
- Face-to-face communication including different modalities.
- Multimodality of meaning in speech and gesture.
- Multimodality in language and speech systems : from theory to design support tool.
- Intelligent Multimedia Presentation Systems
- Developing intelligent multimedia applications.
- Multimodal aids and modality transforms for the handicapped.
- Architectures for integrated multimodal input-output systems and the humanoid interface.
- Multimodal dialogue systems & audio-visual synthesis.

PROGRAMME COMMITTEE

=====

Niels Ole Bernsen, (Odense University, DK)  
Gerrit Bloothoofdt (Utrecht University, NL)  
Paul Mc Kevitt (Aalborg University, DK and Sheffield University, UK)  
Koenraad de Smedt (University of Bergen, NO)  
Alex Waibel (Carnegie-Mellon University, US and Univ of Karlsruhe, DE)  
Wolfgang Wahlster, (University of Saarbruecken, DE)  
Bjrn Granstrm, David House, Inger Karlsson (KTH, SE)

-

~~~~~  
: ELSNET European Network in Language and Speech - <http://www.elsnet.org/> :  
~~~~~

## Appendix C

# Calls for papers on language, vision & music

Here I include two calls for papers which demonstrate my interest in not only promoting the integration of knowledge between disciplines, but also integration of Humanities and Sciences/Engineering, which I believe are important parts of my ideas for universities. First, is a call for papers for Artificial Intelligence Review Journal distributed in May, 1993 on *Language & vision* which eventually resulted in four books (see Mc Kevitt 1995/96). Second, is a call for papers for a Workshop on *Language, vision & music* distributed in Feb., 1999 and for which I was Programme Chair.

## C.1 Language & vision

# Call for papers

Artificial Intelligence Review Journal

## Special issue on Integration of Natural Language and Vision Processing

*Editor:*

Masoud Yazdani  
Department of Computer Science  
University of Exeter,  
GB- EX4 4PT, Exeter  
United Kingdom.  
E-mail: masoud@dcs.exeter.ac.uk

*Guest Editor:*

Paul Mc Kevitt  
Department of Computer Science  
Regent Court  
University of Sheffield  
211 Portobello Street  
GB- S1 4DP, Sheffield  
United Kingdom.  
E-mail: p.mckevitt@dcs.sheffield.ac.uk

Although there has been much progress in developing theories, models and systems in the areas of Natural Language Processing (NLP) and Vision Processing (VP) there has been little progress on integrating these two subareas of Artificial Intelligence (AI).

It is not clear why there has not already been much activity in integrating NLP and VP. Is it because of the long-time reductionist trend in science up until the recent emphasis on chaos theory, non-linear systems, and emergent behaviour? Or, is it because the people who have tended to work on NLP tend to be in other Departments, or of a different ilk, to those who have worked on VP?

Whatever the reason, we believe it is high time to bring together these two areas of AI research. In this endeavour, we are calling for papers for a special issue of AI Review Journal dedicated to site descriptions, surveys, tutorials, and viewpoints on integrated NLP and VP research.

Papers should be sent to the addresses below by **December 30th, 1993**. Feel free to contact Paul Mc Kevitt at the address above for advice on the suitability of manuscripts.

The Journals Editorial Office  
Artificial Intelligence Review  
Kluwer Academic Publishers  
P.O. Box 17  
NL- 3300 AA, Dordrecht  
The Netherlands  
EC.

or

Artificial Intelligence Review  
P.O. Box 230  
Accord, MA 02018-0230  
USA.

## C.2 Language, vision & music

The Eighth International Workshop on the  
Cognitive Science of Natural Language Processing (CSNLP-8)  
(<http://www.it.ucg.ie/csnlp8/>)

"LANGUAGE, VISION & MUSIC"

National University of Ireland, Galway (NUI Galway)  
GALWAY, IRELAND

Monday 9th - Wednesday 11th August, 1999

in association with:

"Mind-IV: TWO SCIENCES OF MIND"

(Monday 16th - Thursday 19th August, 1999)

(Dublin City University, Ireland)

(<http://www.compapp.dcu.ie/~tdoris/mind4.html>)

"LANGUAGE, VISION & MUSIC"

What common cognitive patterns underlie our competence in these disparate modes of thought? Language (natural & formal), vision and music seem to share at least the following attributes: a hierarchical organisation of constituents, recursivity, metaphor, the possibility of self-reference, ambiguity, and systematicity. Can we propose the existence of a general symbol system with instantiations in these three modes or is the only commonality to be found at the level of such entities as cerebral columnar automata? Also, we invite papers which examine cross-cultural experience of these modalities.

What can Engineering of software platforms for integrated Intelligent MultiModal & MultiMedia processing of language/vision/music/etc. tell us?

TOPICS INCLUDE:

- o combinations: language and music; language and vision; music and vision.
- o What can Engineering of software platforms (e.g. AAU CHAMELEON; c.f. <http://www.cpk.auc.dk/imm>) for integrated Intelligent MultiMedia processing of language/vision/etc. tell us?
- o Metaphor: For example: the use of terms like "interval" and "range" in music.
- o Rhythm: How is Rhythm important for language, vision and music?
- o Acoustics: What role does it play in the three modalities?
- o The roles of embodiment and culture in the formation of symbolic apparatus; For example: the use of gesture in face-to-face communication.
- o Emotions: what role do they play in the three modalities?
- o Synesthesia
- o What the visual, musical and linguistic arts can tell us.
- o What is the developmental relationship between prosody and music? What is the cognitive evidence for the dependence of music on language?

- o Can we speak meaningfully about a semantics of music?
- o Architectures for integration of language, vision and music; what aspects are conscious and what automatic? What aspects are common and what are specific to each?
- o What is the role of modelling creativity?  
Are the creative processes similar or in what way are they different?

SPECIAL SESSION ON CREATIVITY:

In AI we have failed to get much handle on creativity.

Conn Mulvihill will Chair a special session on creativity looking at writing, poetry, painting, and music composition.

Irish Nobel Prize Laureate Seamus Heaney is composing a translation of Beowulf at present with special attention to the sound - reminiscent of movement in a longship type craft and there are those that claim that music is central to any hope of understanding Joyce. We think also of the likes of Kandinsky here.

Is Joyce prose or music? Is Kandinsky art or music?

What is Picasso? What are the links between language, vision and music?

Is creativity the same for each? and by the way, What is creativity?

It is intended to involve Writers in Residence at NUI, Galway

Pat McCabe ("The Butcher Boy") & Paula Meehan (Poet).

- o Are recent trends towards integrating ideas in the Arts/Humanities and Sciences/Engineering important here?  
(cf. <http://www.futurehum.uib.no/>  
& <http://tn-speech.essex.ac.uk/tn-speech/>  
& <http://www.cpk.auc.dk/imm>)
- o Why are there many arts and not just one?

## Appendix D

# Aalborg Master's Degree in Intelligent MultiMedia

Here is the proposal for the Aalborg Master's Degree in Intelligent MultiMedia and text for web-based courses on statistics and signal processing.

## D.1 Proposal for Aalborg Master's degree in Intelligent MultiMedia

Here is the formal proposal on a Master's degree in Intelligent MultiMedia which I provided to Aalborg University and on which they based their decision to financially support its establishment over the course of two years after which it should become self-sufficient from its student numbers.

### I. Name

INTERNATIONAL MASTERS DEGREE IN INTELLIGENT MULTIMEDIA  
(M.ENG/SC. DEGREE)  
AALBORG UNIVERSITY, DENMARK

### II. Candidate Profile

Intelligent Multimedia at Aalborg University, Denmark, as an International Masters Degree (M.Eng./Sc.) study programme, will produce candidates with a proficiency in theories, models and systems for the computer integration of multiple media including at least text, speech, sounds and image/vision on multiple and mobile platforms. This will include understanding what these modalities are, the processing of them by computer, and the possibility of hosting them on mobile phones and personal data assistants. By processing here we mean the computer representation of these media and also computer understanding and generation of them in terms of their semantics and that is what makes Intelligent Multimedia different to traditional Multimedia. Traditional multimedia is where machines are more involved in the presentation of text, sounds,

voice and videos and where the computer has no understanding of what it is presenting but more a focus on how best to present it. We also have courses in Humanities and Computer Science at Aalborg University which focus on traditional multimedia.

With this Intelligent Multimedia Masters the candidate will obtain a thorough grounding in courses given in English from the Departments of Computer Science, Medical Informatics/Image Analysis and Communication Technology. Many of the courses are given by teachers who are also researchers in Intelligent Multimedia and we see a close relationship between teaching and research. The candidate will also complete a Master's thesis which will involve an in-depth research problem in the area of Intelligent Multimedia. The candidate will have close access to our Intellimedia 2000+ research programme which will also provide projects for Masters theses.

The candidate will be educated over 1 and 1/2 years in the unique Aalborg style which includes intensive project work in groups. Here, each semester the students work together in groups of four or six on assigned projects and this has proven to give students better opportunities after their education. We also foresee that non-Danish students will have assimilated some Danish culture and language and vice-versa and it is our hope that Danes and non-Danes will exchange experiences useful for looking forward to the future. Initially, the course will not require any payment of fees. Candidates will have adequate training for futures in both university (Ph.D.) and industry and it is our intention that on finishing this Master's course students could also commence Ph.D. studies related to Intellimedia 2000+.

### III. Study environment

Aalborg is situated in the North East of Jutland in Denmark, a member state of the European Union (EU). The city is the fourth largest in Denmark with a population of ca. 150,000. It is a lively city with many restaurants and bars and has all the usual sporting and recreation facilities.

Inaugurated in 1974, Aalborg University now has almost 11,000 students. Teaching and research are conducted at the highest level in the fields of engineering, natural sciences, social sciences and humanities. The university's annual budget is in excess of 750 million Danish kroner.

The study form differs from that of most other universities. The focus is problem based learning, and the main part of the study consists of

working on projects in student groups of 3-6 members. This is obvious at the first sight of the University - the campus is dominated by the numerous group rooms for students.

The Institute of Electronic Systems (IES) has a strong tradition within research activities which fit into the real-time processing of Intelligent Multimedia. A number of research teams have taken the challenge to develop the new curriculum and research in real-time intellimedia systems. These are of (1) Center for PersonKommunikation (CPK) (spoken language dialogue systems), (2) Laboratory of Medical Informatics and Image Analysis (MIBA) (automated diagnostics/expert systems, image/vision), and (3) Computer Science (CS) (theories/platforms/tools).

The Computer Science and Engineering Departments are situated in the main campus of the University.

#### IV. Main themes and topics

This Master's Degree in Intelligent MultiMedia runs for 1 and 1/2 years over 3 semesters. Each semester has a theme associated with it and involves both project work and courses.

This Master's course is open for non-Danish and Danish students. All courses will be given in English and the thesis can be written in English or Danish.

Most courses involve students working on project work in groups in the unique Aalborg style.

Each student is graded according to internationally recognised grading schemes.

For non-Danish students the first semester also includes a course in project work and group work and possible courses in Danish and English language and Danish culture.

#### THEME DESCRIPTIONS

##### SEMESTER I:

THEME: Basic methods for Intelligent MultiMedia

PERIOD: 1st of February - 30th of June

##### PURPOSE:

To study theories, models and systems of basic methods for computer display and semantic understanding of various media such as text, speech, sound, and visual information.

To learn methods for computer analysis and understanding of spoken language and dialogue input and static and dynamic visual information including generation of speech output and graphical representations.

To learn basic programming languages and tools and techniques useful

for Intelligent MultiMedia e.g. Java, Beta, C, C++, statistics, and signal processing.

#### CONTENT:

To focus on a concrete problem in Intelligent MultiMedia which will involve using various methods for representing information from different media sources and programming languages, architectures, tools and techniques useful for completing project demonstrators.

Projects will involve:

(1) a theoretical analysis of a concrete problem including a study of the literature

(2) experimental research, computer programming and testing/simulations of algorithms. Programming can be on a variety of machines including suns, PCs, silicon graphics machines and in a variety of languages including Java, Beta, Lisp, Scheme, C, and C++.

The project is to be documented in a report which will include material assimilated from lectures.

#### COURSES:

Students must take the 3 core courses and 6 modules are selected from the elective courses. Priority must be given to the electives in statistics and signal processing and Java and OOP where necessary. Non-Danish students must take the subsidiary course on Project Work and Group Work. They are also welcome to take the other subsidiary courses.

	modules
core courses: (PE-courses)	
Visual information processing & computer graphics	(2)
Spoken language processing	(2)
Intelligent MultiMedia systems	(3)
elective courses:	
	(6)
*Java & object-oriented programming (OOP)	
*Statistics & signal processing	
Computer networks & internet/WWW	
Databases & information retrieval	
subsidiary courses:	
Project Work & Group Work	(1)
Danish language & culture	(2)
English language	(2)

#### EXAMINATION:

Approximately 50% of the courses will have individual examinations and all courses can be examined as part of an oral examination based on the prepared project report.

#### SEMESTER II:

THEME: Advanced methods for Intelligent MultiMedia

PERIOD: 1st of September - 31st of January

PURPOSE:

To focus on theories, models and systems of advanced methods for computer display and semantic understanding of various media such as text, speech, sound, and visual information.

To learn about software platforms and architectures which are useful for integration of multiple media processing e.g. hypermedia platforms, generic dialogue systems, concurrent structures.

To learn advanced methods in knowledge representation, expert systems and decision taking useful for integration of semantics from various modules processing various media.

To become familiar with the state of the art in Intelligent MultiMedia theories and systems through reading and discussing the latest research papers.

To learn advanced methods for sound localisation and microphone arrays for applications in possible noisy environments e.g. man-machine user interfaces, multimedia conferencing, multiple speaker situations.

To learn advanced visual information processing techniques for applications in interpretation of visual communication in possible occluded environments e.g. gesture, sign language, body language, face expression, active vision and robotics.

To investigate applications of Intelligent MultiMedia for personal data assistants, the internet and mobile platforms.

To investigate links between Intelligent MultiMedia, Psychology of perception, Cognitive Science, Linguistics and semantics, Humanistic Computing and Computer Supported Cooperative Work (CSCW).

CONTENT:

To focus on a concrete problem in Intelligent MultiMedia which will involve using advanced methods and software environments and platforms for representing and integrating information from different media sources in possible occluded or noisy environments.

(1) a theoretical analysis of a concrete problem including a study of the literature

(2) experimental research, computer programming, testing/simulation of algorithms through usage of advanced software (e.g. image processing tools, gesture processing, microphone arrays, HUGIN), together with IntelliMedia platforms (e.g. CHAMELEON, generic dialogue systems, Topsy) for advanced integrated applications (e.g. personal data assistants, spoken dialogue interfaces, camera steering, multimedia conferencing).

The project is to be documented in each of the following forms:

\* scientific article in English

\* poster in English  
 \* address (WWW, workshop/conference/student journal paper) in English  
 Documentation should be supplemented by appendices of edited process sheets of work accomplished. The scientific article will include material assimilated from lectures.

#### COURSES:

Students must take the 3 core courses and 3 modules are selected from each of the elective and subsidiary sets of courses.

	modules
core courses: (PE-courses)	
IntelliMedia platforms	(2)
Decision support systems	(3)
Readings in Intelligent MultiMedia	(1)
elective courses:	(3)
Mobile phones and tele communication	
Sound localisation and microphone arrays	
Acoustics and hearing	
Animation and enhanced reality	
Geographic information systems and planning	
Software engineering	
subsidiary courses:	(3)
Traditional MultiMedia	
Cognitive and computational linguistics	
Psychology of perception	
Humanistic computing	
Computer Supported Cooperative Work (CSCW)	

#### EXAMINATION:

Approximately 50% of the courses will have individual examinations and all courses can be examined as part of an oral examination based on the project documentation.

#### SEMESTER III:

THEME: Master's Thesis in Intelligent MultiMedia

PERIOD: 1st of February - 30th of June

#### PURPOSE:

To focus full-time on a Master's thesis which will be related to projects in our research programme. The thesis can take either an engineering or computer science track or include both.

To expand theoretical and practical knowledge in the chosen field of specialisation.

The thesis can be written in English or Danish.

#### EXAMINATION:

The thesis is examined in an oral examination with two external examiners.

## V. Practical matters

Students are required to have obtained a B.Sc. or B.Eng. degree in Computer Science or Engineering from a recognised university and to have achieved a reasonable standard of average (II(2)) or above grade. All candidates are expected to be reasonably proficient in the English language.

It is recommended that applications are submitted well in advance of the beginning of the semester. Priority will be given to applications received early.

Aalborg University has a long tradition and much experience in student exchange, and can be of assistance with accommodation and other practical matters. Normally, this assistance is offered only if the application is received at least three months before the beginning of the semester.

## VI. Further information

If you wish to receive more information and application formular for the International Masters Degree in Intelligent MultiMedia, please contact:

E-Study Board  
Aalborg University  
Fredrik Bajers Vej 7-B2  
DK-9220 Aalborg East  
DENMARK

E-mail: [masters@kom.auc.dk](mailto:masters@kom.auc.dk)  
Telefax: + 45 98 15 37 68  
Telephone: + 45 96 35 86 99

Information continuously updated on:

<http://www.kom.auc.dk/ESN/masters/>

## D.2 Preparations for “foreigners”

Here we have an instance of a web page for an internet-based course at Aalborg University which places a focus on the fact that foreign students typically do not have sufficient background.

The exam for each course will be available the 21st of December  
Each student must have completed it the 6th of January at the latest

A plain text version of this site is available at:  
[http://www.itl.auc.dk/esnnet/prep/Default\\_plain.htm](http://www.itl.auc.dk/esnnet/prep/Default_plain.htm)

### Preparatory courses

This site contains selected prep-courses for your M.Sc.-studies in Electronic Engineering. From our experience we know that these courses represents some of the areas where foreign students typically do not have sufficient background.

The courses are offered applicants for the Master courses as a free offer.

It is important to stress that:

[Image] When the answer to your application is, that we recommend you to follow one or more of these courses, you must increase your professional knowledge by following the course(s) or some comparable.

[Image] The courses are offered as an assistance for you to improve your skills within these areas - its your responsibility that your professional level is increased as we recommend

[Image] There will be no examinations in the courses - but tests you can take

### About the courses

The courses are primarily meant as self-study courses, with the added benefits of course discussion groups. The discussion groups should be used as way to exchange experiences, discuss problems or ideas and as a way to get further information about obscure points etc. The groups will, of course, be monitored by the respective course teacher.

Each prep-course consists of:

[Image] A recommended literature list

[Image] Recommended plan for taking the course

[Image] Each lesson of the course consists of:

[Image] Purpose of the lesson

[Image] Literature for the lesson

[Image] Assumed time needed for the lesson

[Image] Teachers supplementary explanations

[Image] Examples

[Image] Problems to solve in the form of self-evaluation tests

[Image] Discussion group for the students

[Image] Active follow up from the teacher

[Image] Final test

### Enrollment

To get access to the lessons and discussion groups we require that you apply for a username and password. The reason for this is that the courses, as stated above, is free only for applicants for the Master courses. The actual enrollment is done by pressing the ENROLL link in the index to the left. After filling out the form you will receive a username and password by email within a few days.

After you get your username and password, you need to login to the system by

pressing the LOGON link. If you don't log on to the system, some resources (like the lessons and discussion system), will be unavailable. This is indicated by drawing certain links in red. After logging on and if you have the rights, these links will become active.

Available courses

Basic Digital Signal Processing

Digital Filters and Discrete Fourier Transform

A professional level comparable to this course is necessary for:

- [Image] Acoustics
- [Image] Biomedical Engineering
- [Image] Mobile Communication
- [Image] Intelligent Multimedia (recommended)

Statistics and Stochastic Processes

A professional level comparable to this course is necessary for:

- [Image] Acoustics
- [Image] Biomedical Engineering
- [Image] Mobile Communication

[Image]

Last changed: 12/23/98

Please report any problems to: bkirk@control.auc.dk

## Appendix E

# European Master's in language and speech

Here we have contents descriptions on 'LE applications' and 'Natural Language Processing (NLP)' and wording for certification for the "European Master's in language and speech" EU Socrates Curriculum Design Action (CDA) project.

### E.1 LE applications

Here we have a content description on 'LE applications' which I produced together with Prof. Hervé Bourlard.

LE applications

Outline

Any content on Language Engineering (LE) Applications will include (1) generic technologies, (2) standard applications, (3) systems design, and (4) tools and platforms. Generic technologies include the basic methods needed to process speech and text. Standard applications are the typical areas where working systems can be applied. These do not change much over the years although their specific manifestations do. Systems design is where everything comes together by learning how to design prototype application systems incorporating generic technologies. Tools and platforms focus on the basic tools which everyone uses but also larger comprehensive platforms now available for building more integrated systems. Group work and project-based education are important here due to the need for integrating the processing of different phenomena such as signals and symbols, but also multimodality.

Topics

- \* Generic technologies
  - o speech recognition
  - o speech synthesis/TTS
  - o text processing (preprocessing + parsing)
  - o text generation
  - o integration of speech and text processing (signals <-> symbols <-> symbols)
  - o multimodal integration (e.g. with visual input)

- o data collection (ELRA, LDC), requirements, evaluation and training
- \* Standard applications (including design issues, speaking environment, human factors, and examples)
  - o Command-and-control
  - o Intelligent MultiMedia (MultiModal) systems
  - o Spoken dialogue systems
  - o Information Retrieval (IR) and Extraction (IE)
  - o Dictation
  - o Machine Translation (MT)
  - o Computer Aided Language Learning (CALL)
- \* Systems design
  - o Requirements, development, evaluation and testing
  - o Empirical methods (databases, knowledge elicitation)
  - o Architectures & communications systems
  - o Standards: e.g. EAGLES, ELRA
- \* Tools and Platforms
  - o tools, e.g. Waves, Matlab, Entropic HTK
  - o evaluation and usage of a typical platform (typically as groupwork or project-based building of prototype application systems)

#### References

1. [Ber]: Bernsen, Niels Ole, Hans Dybkjaer and Laila Dybkjaer (1998) Designing interactive speech systems: from first ideas to user testing, New York: Springer-Verlag.
2. [Cole]: Cole, Ronald A., Joseph Mariani, Hans Uszkoreit, Annie Zaenen, Victor Zue, Giovanni Varile, Antonio Zampolli (1995) Survey of the state of the art in human language technology, ([www.cse.org.edu/CSLU/HLTsurvey.html](http://www.cse.org.edu/CSLU/HLTsurvey.html)), ([www.elsnet.org/publications/hlt](http://www.elsnet.org/publications/hlt)).
3. [Del]: Deller, J., Proakis, J., and Hansen, J. (1993) Discrete-time processing of speech signals, New York, US: MacMillan Publishing Company.
4. [Gibb]: Gibbon, Dafydd, Roger Moore and Richard Winski (Eds.) (1997) Handbook of standards and resources for spoken language systems, Spoken language system and corpus design, Spoken language characterisation, Spoken language system assessment, Spoken language reference manuals, Berlin, Germany: Mouton de Gruyter.
5. [IIR]: Inventory of Internet Resources, SOCRATES Thematic Network in speech communication sciences, <http://www.phon.ucl.ac.uk/resource/cal-top.htm>
6. [Jel]: Jelinek, F. (1998) Statistical Method for Speech Recognition, MIT Press, Cambridge Massachusetts.
7. [Mar]: Judith Markovitch (1996) Using Speech Recognition, Prentice Hall.
8. [McKev]: Mc Kevitt, Paul (Ed.) (1995/1996) Integration of Natural Language and Vision Processing (Vols. I-IV), Dordrecht, The Netherlands: Kluwer-Academic Publishers.
9. [Young]: Young, Steve and Gerrit Bloothoof (1997) Corpus-based methods in language and speech processing, Dordrecht, The Netherlands: Kluwer-Academic Publishers.

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## E.2 Natural Language Processing (NLP)

Here we have three contents descriptions on Natural Language Processing (NLP) for the “European Master's in language and speech” EU Socrates Curriculum Design Action (CDA) project. The first is a draft NLP contents description which was to be updated. Note that even the title of the contents description has a specialised tint on NLP. The second is an NLP course contents description (in French) of the content providers from their institution (taken from the WWW) to show closeness of match and a possible case of vested interests. The third is the proper general contents description on NLP which I finally produced and what would normally be expected of a general course on NLP.

### E.2.1 Corpus-based Natural Language Processing

Corpus-based Natural Language Processing: Basic course outline

Title Corpus-based Natural Language Processing  
 Aim The principal objective of this course is to present the different models, formalisms and algorithms that can be used for an efficient development of corpus-based natural language processing techniques in the framework of industrial applications.  
 Volume 3 contact hours, plus 3 hours' homework per week, for 1 semester.

-----

#### OBJECTIVES

The design of Natural Language Processing tools in the framework of industrial applications is subject to strong constraints (short design cycles, low linguistic expertise, real time constraints, ...) that are often not compatible with the methods and techniques used in traditional computational linguistics. The main objective of this course is to present how the recent corpus-based approaches can be used to design large-scale NLP systems. Basic models, formalisms and algorithms will be presented that allow the integration of data-driven techniques in the various levels (lexical, syntactic, semantic) of automated language processing.

-----

#### CONTENTS

##### 1 Introduction

- \* Industrial applications of NLP techniques.
- \* The different analysis levels used for NLP (morpho-lexical, syntactic, semantic/pragmatic).

##### 2 Lexical level

- \* Efficient representations for linguistic resources (lexica, grammars, ...): tries and finite-state automata
- \* Error-tolerant lexical processing (spelling error correction)
- \* Transducers for the design of morphologic analyzers
- \* Towards syntax: Part-of-speech tagging (Brill, HMM)

##### 3 Syntactical level

- \* Context-free grammars.
- \* Parsing of context-free grammars (CYK algorithm, Earley algorithm)
- \* Stochastic grammars.
- \* Automated estimation of probabilistic model parameters (inside-outside algorithm)
- \* Data Oriented Parsing.

#### 4 Semantical/pragmatical level

- \* Attributive grammars.
- \* Unification-based grammars.
- \* Vector Space approaches
- \* Distributional Semantics

---

#### PREREQUISITES

The course is designed to be self-sufficient. However, some previous experience with probabilities and programming concepts such as abstract data type or computational complexity could be helpful for quick understanding of the formal parts.

---

#### BIBLIOGRAPHY

##### In paper form

- \* James Allen, "Natural Language Understanding", Benjamin/Cummings Publ., 2nd edition, 1995
- \* Eugene Charniak, "Statistical Language Learning", MIT Press
- \* Harry Bunt and Masaru Tomita (eds.), "Recent Advances in Parsing Technology", Kluwer, 1996
- \* Emmanuel Roche and Yves Shabes (eds.), "Finite State Language Processing", MIT Press, 1997
- \* S. Young and G. Bloothoof, "Corpus-based Methods in Language and Speech Processing", Kluwer, 1997
- \* Krenn & Samuelsson compendium on statistical approaches in computational linguistics : Warning! following this link downloads a PostScript file.

##### On the web

- \* [comp.ai.nat-lang FAQ](#)
- \* [Yahoo NLP pages](#)
- \* [The ACL NLP/CL Universe: lots of pointers on NLP](#)
- \* [Survey of the State of the Art in Human Language Technology](#)
- \* [Speech and language Web resources by Kenji Kita](#)

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Send comments to: [Gerrit Bloothoof](#)

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## E.2.2 NLP course description from institution

[Image]

Traitement Automatique du Langage (TAL)

Cours de 6e semestre du Dpartement Informatique (Edition 1999)

[Image]

[Image] Enseignants / Charges de cours :

Pr. Herv Bourlard	Dr. Martin Rajman	Dr. Jean-Cdric Chappelier
Bureau : INR-230	Bureau : INR-233	
Tlphone : ????	Tlphone : 5277	Bureau : INR-232
E-mail :	E-mail :	Tlphone : 6683
boulevard@idiap.ch	rajman@lia.di.epfl.ch	E-mail : chaps@lia.di.epfl.ch

[Image] Descriptif du cours

[Image] Emploi du temps

[Image] Transparents du cours

[Image] valuation/Projets/Examen

[Image] FAQ

[Image] Bibliographie :

1. James Allen, "Natural Language Understanding", Benjamin/Cummings Publ., 2nd edition, 1995
2. Grard Sabah, "L'intelligence artificielle et le langage", Vol. 1 et 2, Herms, 1988/1989
3. Eugene Charniak, "Statistical Language Learning", MIT Press, 1993
4. Eric Wehrli, "L'analyse syntaxique des langues naturelles; Problmes et mthodes", Masson, 1997
5. Harry Bunt and Masaru Tomita (eds.), "Recent Advances in Parsing Technology", Kluwer, 1996
6. Emmanuel Roche and Yves Shabes (eds.), "Finite State Language Processing", MIT Press, 1997
7. S. Young and G. Bloothoof, "Corpus-based Methods in Language and Speech Processing", Kluwer, 1997
8. Pointeurs WWW relatifs au TAL

[Image] Exemples d'offres d'emploi (version 1998)

[Image]

Page maintenue par Jean-Cdric Chappelier  
(chaps@lia.di.epfl.ch)

[Image]

## Traitement Automatique du Langage (TAL)

Cours de 6e semestre du Dpartement Informatique (Edition 1998)

### Descriptif du cours

[Image]

[Image] Objectifs :

Il s'agit d'un cours d'informatique linguistique dont l'objectif est de presenter les principaux modles, formalismes et algorithmes permettant la mise en oeuvre d'applications dans le domaine des industries de la langue et de la manipulation automatique de donnees textuelles (correction orthographique et syntaxique, traduction, recherche documentaire, text-minig, ...).

[Image] Contenu :

#### 1. Introduction :

- + Ingnieurie linguistique : presentation des principaux domaines d'application du traitement automatique du langage
- + Le langage humain et ses fonctions (communication, representation des connaissances)

#### 2. Modles et algorithmes pour le traitement automatique du langage :

- + Le niveau morpho-lexical
  - \* Lexiques informatiss (contenu, structures et algorithmes) ;
  - \* Correction "orthographique" (algorithmes) ;
  - \* Des mots aux sons: la conversion graphmes-phonmes ;
  - \* tiquetage/Lemmatisation (approches symbolique et probabiliste).
- + Le niveau syntaxique
  - \* Formalismes et algorithmes gnraux pour l'analyse syntaxique du langage (grammaires rgulires, grammaires non contextuelles, algorithmes polynomiaux d'analyse : CYK, Earley, Chart Parsing, ...) ;
  - \* Approche probabiliste de l'analyse syntaxique (grammaires stochastiques, Monte-Carlo Parsing) ;
- + Le niveau smantique et pragmatique
  - \* Modles et formalismes pour la representation du sens (grammaires attribues, grammaires d'unification, ... ) ;
  - \* Exemples d'utilisation de connaissances smantiques et pragmatiques (cas de la recherche documentaire et de l'analyse de contenu) ;

#### 3. Evaluation des systemes de traitement du langage

- + Description des principales mthodologies d'valuation (EAGLES, GRACE, ...)

#### 4. Les ressources linguistiques

- + Prsentation des principales sources de production de donnes linguistiques (Linguistic Data Consortium, European Language Resources Association, ...)

5. Exemples d'applications :

- + Introduction la reconnaissance de la parole
  - \* Aperu des principales techniques de reconnaissance de la parole ;
  - \* Domaines d'application : commande vocale, serveurs vocaux, dicte vocale, ...
- + Traduction automatique

Le contenu dtaill scance par scance peut tre lu ici

[Image] Forme de l'enseignement :

Cet enseignement sera donn sous la forme de cours magistraux et d'exercices pratiques. Une part importante du volume horaire sera ddie aux travaux dirigs qui permettront aux tudians de mettre en pratique les mthodes presentes. Ces travaux dirigs seront complts par la ralisation de projets d'quipe.

[Image] Documentation :

Transparents du cours disponibles sur le Web.

[Image]

Page maintenue par Jean-Cdric Chappelier  
(chaps@lia.di.epfl.ch)

Dernire mise jour le 10 mars 1998

## E.2.3 Final NLP contents description

Natural Language Processing (NLP)

Outline

Any content on Natural Language Processing (NLP) will include models, formalisms and algorithms that can be used for development of systems for processing text in terms of both analysis and generation. Techniques include traditional grammar-based and the more recent statistical/corpus-based methods.

Topics

### 1 Introduction

- \* Applications of NLP techniques  
(MT, grammar checkers, dictation, document generation, NL interfaces)
- \* The different analysis levels used for NLP  
(morpho-lexical, syntactic, semantic, pragmatic)
- \* markup (TEI, UNICODE)
- \* Finite state automata
- \* Recursive transition networks
- \* Augmented transition networks

### 2 Lexical level

- \* Error-tolerant lexical processing (spelling error correction)
- \* Transducers for the design of morphologic analyzers
- \* Features
- \* Towards syntax: Part-of-speech tagging (Brill, HMM)
- \* Efficient representations for linguistic resources  
(lexica, grammars,...): tries and finite-state automata

### 3 Syntactic level

- \* Grammars  
(e.g. Formal/Chomsky hierarchy, DCGs, systemic, case, unification, stochastic)
- \* Parsing (top-down, bottom-up, chart (Earley algorithm), CYK algorithm)
- \* Automated estimation of probabilistic model parameters  
(inside-outside algorithm)
- \* Data Oriented Parsing

### 4 Semantic level

- \* Logical forms
- \* Ambiguity resolution
- \* Semantic networks
- \* Semantic parsers
- \* Procedural semantics
- \* Montague semantics
- \* Vector Space approaches

- \* Distributional Semantics

#### 5 Pragmatic level

- \* Knowledge representation
- \* Reasoning
- \* Plan/goal recognition
- \* speech acts/intentions
- \* belief models
- \* discourse
- \* reference

#### 6 Natural language generation

- \* content determination
- \* sentence planning
- \* surface realisation

#### 7 Other approaches

- \* statistical/corpus-based NLP
- \* connectionist NLP

---

#### PREREQUISITES

The course is designed to be self-sufficient. However, some previous experience with AI, prolog programming, probabilities and programming concepts such as abstract data type or computational complexity could be helpful for quick understanding of the formal parts.

---

#### BIBLIOGRAPHY

##### In paper form

- \* James Allen, "Natural Language Understanding", Benjamin/Cummings Publ., 2nd edition, 1995
- \* Gazdar, G. and Mellish, C. (1989)  
Natural language processing in Prolog.  
Addison-Wesley.
- \* Eugene Charniak, "Statistical Language Learning", MIT Press
- \* Harry Bunt and Masaru Tomita (eds.), "Recent Advances in Parsing Technology", Kluwer, 1996
- \* Emmanuel Roche and Yves Shabes (eds.), "Finite State Language Processing", MIT Press, 1997
- \* S. Young and G. Bloothoof, "Corpus-based Methods in Language and Speech Processing", Kluwer, 1997
- \* Krenn & Samuelsson compendium on statistical approaches in computational linguistics : Warning! following this link downloads a PostScript file.

## On the web

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- \* [Yahoo NLP pages](#)
- \* [The ACL NLP/CL Universe: lots of pointers on NLP](#)
- \* [Survey of the State of the Art in Human Language Technology](#)
- \* [Speech and language Web resources by Kenji Kita](#)

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Send comments to: Gerrit Bloothoof

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### E.3 Wording of certification

Here is the text of the proposed wording for a certificate to be offered for the European Master's Degree in language and speech. Of particular interest are the "date" of birth and "place and country" of origin slots.

-----  
By this certificate we testify that <NAME>, born on <date> in <place and country>, has met all the requirements for the EUROPEAN MASTERS STUDY IN LANGUAGE AND SPEECH at the <name, place and country of the University or Universities>, and has thus demonstrated a high standard of learning in language and speech communication, as partial fulfillment of <candidate's degree>.

For the <name of University(ies)>  
<signature and name of the chair of the local examination commission>

For the European Speech Communication Association  
<signature and name of the ESCA president>

For the European Chapter of the Association of Computation Linguistics  
<signature and name of the EACL president>

--

# Appendix F

## Speech communication sciences

Included here is a response to a questionnaire and module descriptions for the “Speech communication sciences” EU Socrates Thematic Network Project (TNP) and three module descriptions on “spoken language engineering (SLE)” for the “Speech communication sciences” EU Socrates Thematic Network Project (TNP).

### F.1 Questionnaire

Here is my response, on behalf of Aalborg University, to a questionnaire provided to institutions as part of the “Speech communication sciences” EU Socrates Thematic Network Project (TNP).

SOCRATES/ERASMUS THEMATIC NETWORK

SPEECH COMMUNICATION SCIENCES

\*\*\*\*\*

QUESTIONS FOR ALL PARTNERS

In order to provide the four working groups of our Thematic Network “Speech Communication Sciences” with initial material that may give guidance to activities in the period between January and August 1997 we would like to get your Department/Institution’s views on the following questions:

—————QUESTIONS—————

1. In your view, what type of training/education makes a good phonetician, spoken language technologist or speech and language therapist?  
[choose your own specialisation(s) and try to write down a view, not merely a list of courses or skills, maximum 4 pages A4]

With respect to spoken language technology and phonetics we believe a good

training/education involves learning about the basic tools, theories, models and technology needed.

This will involve learning about the basics of signal processing, statistical modelling, Hidden Markov Models, neural networks, phonetics, and linguistics (including syntax, semantics, and

pragmatics). The student would be given a thorough grounding in how to develop applications which can perform speech recognition as well as synthesis and a view of the current state of the art in the field. It would be important to learn how to use current tools like Waves and HTK and any other necessary programming languages like Java and C++ in order to develop working systems. The current trends towards using spoken language technology in Multilinguality and MultiMedia would need to be addressed. Most important would be a focus on the possible applications of spoken language technology including personal data assistants, mobile platforms, machine translation and spoken dialogue systems. Courses should stress the theoretical as well as the practical, project work, and the ability to work in groups, as much of spoken language technology involves groupwork. Critical thinking and evaluation of research work from the latest publications should be taught.

2. What cross-links are desirable between training in phonetics, spoken language engineering and speech and language therapy?  
[Any other cross-links you want to discuss are welcomed too!]

Phonetics is obviously important for spoken language engineering because of the need for speech recognisers and synthesizers to work effectively. It is common nowadays to see many engineers involved in incorporating phonetics into their speech processing systems. Speech technology can be used to help people practice and improve their speech and also to assist in the processing of data from the disabled in order to understand better their problems. Also, speech synthesizers can be improved to help those who cannot speak and of course auditory technology is important for the development of hearing aids.

3. What expectations do you have of the labour market for phoneticians, spoken language technologists and speech and language therapists, and how should this affect education?  
[choose your own specialisation(s)]

There are lots of labour opportunities for spoken language technologists as we can see from the numerous employment advertisements on ELSNET. What is interesting about these advertisements is that many of them come from companies who are doing research in this area. As more and more companies move towards developing spoken language technology and integrating it with their software we will see more employment opportunities.

4. What is your experience in the use or development of computer-assisted learning, in particular via the internet?

NONE.

5. What do you hope to get from your participation in this Thematic Network?

We see the groups as providing a forum for exchange of ideas, technology, databases of corpora and information on the latest research results.

6. What do you think your institution can contribute to the Thematic Network?

We would hope to be able to provide the working groups with information and software from our latest research results. We can provide spoken language technology software and expertise in the areas of emphasis of the various working groups. We can also provide educational expertise in terms of the new International Masters degrees we have developed in the areas of Intelligent MultiMedia and Acoustics and are developing in PersonKommunikation.

---

Please send your answers to Gerrit Bloothoofst before November 7, 1996.

This deadline is chosen to give working groups some time to consider the responses in the preparation of the meeting of working groups on 10,11,12 January 1997.

Besides our internal procedure, the first three questions will be given a wider distribution to provide all members of our community the opportunity to present their views, whether they are in the Thematic Network or not. The recommended deadline there will be January 1, 1997.

The working groups will consider all contributions and select the most constructive ones which will be published as part of the book concluding the first year of the Thematic Network.

--

```

=====
Gerrit Bloothoofst
Research Institute for Language and Speech (OTS)  . * *  ***.***  *****
Trans 10, 3512 JK Utrecht, The Netherlands      . * **  **.   **
Phone: +31.30.2536042                             . * **  ** .  ****
Fax:   +31.30.2536000                             . * **  ** .  . *
Email: Gerrit.Bloothoofst@let.ruu.nl             .   ***  **   *.***
=====

```

## F.2 Module descriptions for “spoken language engineering (SLE)”

Here are three module descriptions on “spoken language engineering (SLE)” which I completed together with Prof. Mike McTear, University of Ulster, N.Ireland for the “Speech communication sciences” EU Socrates Thematic Network Project (TNP). The SLE group whilst conducting curriculum development decided to make a distinction between courses in SLE offered as part of other degrees and courses offered as part of a specialist degree in spoken language engineering. Hence, the first two module descriptions given here (F.2.1, F.2.2) would be provided as part of degree courses in Artificial Intelligence, Cognitive Science or Psychology whereas the third (F.2.3) would be provided as part of a Spoken language engineering degree course.

### F.2.1 Speech and language technology

Spoken Language Engineering Working Group

Module Profile

Contributor(s): Paul Mc Kevitt, Michael McTear

1. Degree Course

Artificial Intelligence, Cognitive Science or Psychology.

-----

2. Module title

Speech and Language Technology

-----

3. Level

Final Year Undergraduate

-----

4. Proportion of Student time

One sixth of a student’s curriculum for the final year.

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5. Aims and Objectives

The aim of this module is to provide students with a basic introduction to the theory and practice of speech and language technology. Students should be able to appreciate the fundamental issues underlying research and development in spoken language systems. Students should be able to develop simple applications and to use and modify existing systems.

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6. Prerequisites

Computer Science skills: ideally the following

- o Algorithms, data structures, programming skills: Fundamentals of problem analysis, structured and modular program design, implementation of data structures. Formal specification of language. Object-oriented programming. Basics of C/C++/Java/Smalltalk. Logic programming.

- o Information storage and retrieval: Basic concepts and architectures of database systems. Data modelling, database design, implementation and management.
  - o Transmission of information: Data communications, computer networking, network management. Standards and protocols. Network security. Wireless communication. Mobile Computing.
  - o Systems analysis and design: Software Engineering. Fundamental issues in the systems life cycle. Tools and methodologies for systems analysis and design.
  - o Human Computer Interface: Human computer interface design. Graphical user interfaces. Multi-modal systems.
- 

#### 7. Syllabus

- o Speech Processing Basics of phonetics and phonology. Fundamental principles of speech recognition: probabilistic methods, neural networks, Hidden Markov Models, search. Use of language models. Speech synthesis.
  - o Linguistics and Natural Language Processing Components of a natural language processing system. Grammars: syntactic theories, computational linguistic formalisms - unification-based. Parsing - transition networks, chart parsing. Semantic representation - model theory, logics, case frames. Pragmatics - speech act theory, discourse structure, beliefs, plans and intentions.
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#### 8. Best Practice

(recommended textbooks, software packages, projects...)

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#### 9. Existing Similar Courses

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#### 10. ANY OTHER POINTS

## F.2.2 Spoken language applications

Spoken Language Engineering Working Group

Module Profile

Contributor(s): Paul Mc Kevitt, Michael McTear

1. Degree Course

Artificial Intelligence, Cognitive Science or Psychology.

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2. Module title

Spoken Language Applications

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3. Level

Final Year Undergraduate

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4. Proportion of Student time

1/6 of student year

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5. Aims and Objectives

The aim of this module is to introduce students to a range of application areas in Spoken Language Engineering. Where possible, students will have the opportunity to use and evaluate working systems.

6. Prerequisites

Computer Science skills

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7. Syllabus

- o Speech interfaces command and control systems; systems for Web navigation; control of equipment; speech in support of the disabled.
  - o Dictation systems comparison of major dictation systems: VoiceType, VoicePad, DragonDictate
  - o Spoken dialogue systems examples - SUNDIAL, TRAINS, Philips Dialogue System; architectures; empirical methods - data collection, design and development, evaluation; principles and methods for dialogue control; toolkits - CSLU toolkit, CPK Generic Dialogue System (GDS) Platform, SpeechMania, Vocalist.
  - o Speech Translation - e.g. Verbmobil
  - o Spoken Information Extraction use of speech to retrieve information; retrieval of video tape information by speech; applications in security: speaker identification and verificatio
- 

8. Best Practice

(recommended textbooks, software packages, projects...)

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9. Existing Similar Courses

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10. ANY OTHER POINTS

### F.2.3 Computing for Spoken Language Engineering

Spoken Language Engineering Working Group

Module Profile

Contributor(s): Michael McTear, Paul Mc Kevitt

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Degree Course

Spoken Language Engineering Specialist  
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Module Title

Computing for Spoken Language Engineering  
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Level  
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Proportion of Student time  
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Aims and Objectives

Students should have an understanding of the basic principles of the theory and practice of computing as required for the development of spoken language systems. They should be able to apply this understanding to the development and use of working applications.  
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Prerequisites  
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Syllabus

- o Algorithms, data structures, programming skills Fundamentals of problem analysis, structured and modular program design, implementation of data structures. Formal specification of language. Object-oriented programming. Basics of C and C++. Logic programming.
- o Information storage and retrieval Basic concepts and architectures of database systems. Data modelling, database design, implementation and management.
- o Transmission of information Data communications, computer

networking, network management. Standards and protocols. Network security. Wireless communication.

- o Systems analysis and design Fundamental issues in the systems life cycle. Tools and methodologies for systems analysis and design.
- o Artificial intelligence Knowledge representation. Reasoning. Search. Natural Language Processing Functional components of a natural language processing system. Grammars and parsing. Semantic representation. Human Computer Interface Human computer interface design. Graphical user interfaces. Multi-modal systems.

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Best Practice

(recommended textbooks, software packages, projects...)  
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Existing Similar Courses  
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ANY OTHER POINTS  
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## Appendix G

# Advanced computing in the humanities (ACO\*HUM)

Included here is the introduction and conclusion of a chapter entitled “European studies in computational linguistics” for the ACO\*HUM handbook of the EU Socrates Thematic Network Project (TNP). This full draft text for the chapter is given on <http://www.hd.uib.no/AcoHum/cl/cl-chapter2.html>

### 1 The changing field of computational linguistics and human language technologies

Paul Mc Kevitt and Koenraad de Smedt

Computational linguistics (CL) or natural language processing (NLP) is concerned with the processing of written text, whether dialogue or discourse, by computer (Allen 1995, Gazdar and Mellish 1989 and Roche and Shabes 1997).

Those who use the term

‘Computational Linguistics’ tend to be more concerned with theories and formalisms from linguistics

whereas those using ‘Natural Language Processing’ tend to be more in the engineering camp, more allied to the field of Artificial Intelligence (AI), and not necessarily dedicated to linguistics – we shall use both

terms interchangeably here. CL/NLP is distinguished from that of speech processing by the very fact that it is concerned with symbol processing of symbolic text and representations rather than signal processing of signals.

In the past the field

has mainly been concerned with parsing input texts, whether dialogue or discourse, into meaning representations and mapping these representations into text output. The main efforts have been focussed on methods for efficient parsing, for representing the lexicon, syntax, semantics and pragmatics of natural language, for resolving ambiguity,

for representing the meaning

of dialogue or discourse and efficient methods for generating text from meaning representations. Much work

has focussed on syntax rather than semantics and pragmatics since

syntax is less slippery, with the realisation of late that semantics/pragmatics processing is just as important for determining peoples' intentions in language. There has been much focus on formalisms such as Generalised Phrase Structure Grammar (GPSG) and Head-driven Phrase Structure Grammar (HPSG) for representing and specifying lexicons and their associated grammars. Until the 1990s the field has been tied up with the processing of intricacies of garden-path and other sentences and resolving their ambiguities and less on solving real-world application problems. Obsessions with linguistics itself rather than the occurrence of language in everyday life have caused people like Gethin (1992) to write books like "Antilinguistics".

### 1.1 Where are we now?

During the 1990's there has been much more of a focus on developing CL/NLP methods for solving real-world application problems mainly in the area of dialogue systems (Bernsen et al. 1998, Dalsgaard et al. 1995, 1999, Gibbon et al. 1997) but also in information retrieval (IR) (TREC-7 1998) and extraction (IE) (MUC-7 1998) systems with a lesser focus on machine translation or machine-aided translation (Cole et al. 1995). The term 'Language Engineering (LE)' has become popular for describing this new applied approach to CL/NLP. There has been much work on developing statistical methods for eliciting data needed for CL/NLP systems from large corpora (Charniak 1993, Krenn and Samuelsson 1997 and Young and Bloothoof 1997). The field of speech processing sees more and more the need for CL/NLP and hence there is a lot more work on developing integrated speech/CL/NLP systems (Bloothoof et al. 1997, 1998a, 1999, Green et al. 1997, Jurafsky and Martin 1999, McTear and Kouroupetroglou 1998, and Young and Bloothoof 1997). Over the past few years the speech community has had much success with developing working spoken dialogue systems for limited application domains such as banking, travel information, weather information, call centre routing, and so on. For example, Lucent Technologies' Bell Laboratories claims their call centre routing speech system for banking and insurance performs better than humans at routing phone calls. It is becoming clear that much of CL/NLP is now finding its home within the speech or spoken dialogue community. The other main area of application of CL/NLP is information extraction (IE) or retrieval (IR). Again, this focus has arisen due to the needs of yet another community, i.e. information retrieval, who want smarter methods for retrieving information from texts. The USA has established national MUC (Message Understanding Conferences) for competing IE systems (MUC-7 1998) to parallel those TREC (Text Retrieval Conferences) already held in information retrieval (TREC-7 1998).

The recent upsurge of work in Intelligent MultiMedia or MultiModal systems integrating graphics, image processing, haptic and other modalities also incorporates CL/NLP mainly as part of dialogue interfaces (Brøndsted et al. 1998, Dalsgaard et al. 1999, Maybury 1993, Maybury and Wahlster 1998, and Mc Kevitt 1995/96, 1998a,b).

It is becoming very clear that the integration of speech and language processing with respective signal and symbol processing is an instance of where the Humanities and Science/Engineering are converging (Bloothoofst 1998, de Smedt and Apollon 1998, and McTear and Kouroupetroglou 1998).

When one moves to Intelligent MultiMedia and MultiModal systems incorporating graphics, vision and other modalities and then applied to art, music, dance, creativity etc. this convergence becomes all the more apparent (Maybury 1993, Mc Kevitt 1995/96, 1998a,b). Also, the internet or SuperinformationhighwayS are forcing the merging of the Humanities and Sciences/Engineering in terms of representing and accessing information in multiple modalities including at least text, voice, sounds and images/videos (Intelligent Multimedia). Language will be input in multiple formats including multiple natural languages as well as formal languages and images in the form of simple diagrams right up to videos. The Humanities will be concerned more with the content of the information being passed while the Sciences/Engineering will be more concerned with representation and transmission (Mc Kevitt 1998a,b) SuperinformationhighwayS which have massive stores of information in MultiMedia forms require more intelligent means of information retrieval, where “less” means “more”, through spoken dialogue and other methods. This is and will be a major application area of Intelligent MultiMedia (Maybury 1997). CL/NLP has a large part to play in the convergence of Humanities and Science/Engineering and in fact CL/NLP has since the sixties been the earliest field in the humanities to adapt to new information technologies.

Mobile computing and communications devices are becoming more prevalent and computers are ubiquitous and even invisible (Mc Kevitt et al. 1997).

There has been rapid convergence of computing and telecommunications technologies in the past few years (IEEE Spectrum 1996). These will soon enable users to interact with perceptual speech and image data at remote sites and where that data can be integrated and processed at some central source with the possibility of results being relayed back to the user. The increase in bandwidth for wired and wireless networks and the proliferation of hand-held devices (e.g. NOKIA 9000 communicator<sup>1</sup>) and computers (Bruegge and Bennington

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<sup>1</sup>NOKIA 9000 communicator is a trademark of NOKIA.

1996, Rudnický et al. 1996, Smailagic and Siewiorek 1996) brings this possibility even closer. Applications of mobile IntelliMedia are numerous including data fusion during emergencies, remote maintenance, remote medical assistance, distance teaching and internet web browsing. One can imagine mobile offices where one can transfer money from/to your bank account, order goods and tickets even while car cruising. The possibility of controlling robots through mobile communications is gaining momentum (Uhlen and Johansson 1996) and will continue to flourish. There are also applications within virtual reality and a feel for these is given in IEEE Spectrum (1997).

## 1.2 Education

On the education front there are a number of developments and many linking speech and CL/NLP together for the same reasons as mentioned above (Bloothoof 1998). First, there is the EU Socrates Curriculum Development Action (CDA) network project (1997-2000) which has the goal of developing the curriculum for a pan-european Master's degree course in language and speech which will commence in October 1999.

The goal is to implement a 1 and 1/2 year Master's where students will be required to spend at least three months at another institution in another European country. The idea is also that students will be able to avail of expertise at another institution which may not exist at their own. CL/NLP is represented in this Master's through at least three content descriptions: theoretical linguistics, natural language processing, and language engineering applications.

The Socrates project is detailed further in Bloothoof (1999b), Bloothoof et al. (1998b) and on <http://www.cstr.ed.ac.uk/EuroMasters/>

The Master's degree in Intelligent MultiMedia at Aalborg University, Denmark which is part of the European Master's focusses not only on text and speech but also on vision and their mutual integration (see <http://www.cpk.auc.dk/imm>) and MultiModality is also a focus of this year's ELSNET Summer School (see <http://www.speech.kth.se/milass>)

Second, there is the "Speech communication sciences" EU Socrates Thematic Network Project (TNP) (1997-1999) (Bloothoof 1996, 1997, 1998, 1999a, Bloothoof et al. 1997, 1998a, 1999 and <http://tn-speech.essex.ac.uk/tn-speech/>).

coordination for higher education within europe. The network consists of 80 partner institutions which are mainly European but not limited to Europe. The goal of the network is to analyse the present status of education in speech communication sciences in Europe and then to make proposals on existing curricula and recommendations for the future.

The network also encourages computer-supported teaching and use of the internet. The relationship between academic

education and industrial needs and the need to develop specialised training is of importance. The network consists of four subgroups which focus on the topics of

- (1) phonetics, (2) spoken language engineering (SLE) (Green et al. 1997 and McTear and Kouroupetroglou 1998),
- (3) speech and language therapy, and
- (4) computer-aided learning (CAL) and use of the internet (Bowerman et al. 1999, Huckvale et al. 1997, 1998).

CL/NLP also

needs an overview of institutions in Europe dedicated to teaching the science and this is our goal in this chapter.

Both of the above projects include language as well as speech, with speech being more prominent in both and the projects are welcome since they again encourage links between the two communities.

Finally, last but not least, there are two previous EU Erasmus Inter-university Cooperation Programme (ICP) networks which are particularly relevant here.

First there is the EU Erasmus ICP network project on Natural Language Processing (NLP) (1993-1996) (Way 1998 and <http://www.compapp.dcu.ie/~away/erasmus.html>).

A result of this project has been to specify a curriculum for a European Bachelor's Degree in Natural Language Processing. This group joined the ACO\*HUM network project in 1996 and the curriculum has continued to be developed as is detailed below in Section 3.

(KOENRAAD PLEASE FILL HERE)

There was another

EU Erasmus ICP network project on "Logic, language and information" (1993-1996 ???) (see ) organised by the European Association for Logic, Language and Information (FoLLI) but it is not clear that it has resulted in substantial curriculum development results although there have been a number of summer schools in this area (see <http://www.folli.uva.nl/Esslli/esslli.html>).

(KOENRAAD PLEASE FILL HERE)

The internet and distance education is having an impact on education in speech and CL/NLP (de Smedt 1998).

The CAL/internet group mentioned above has conducted detailed studies on CAL packages available for the teaching of speech and CL/NLP (Bowerman et al. 1999, Huckvale et al. 1997, 1998, Inventory 1999) and there has been a workshop on methods and tools for speech science education (Hazan and Holland 1999) and an education arena is being organised for Eurospeech-99 (see <http://www.ling.umu.se/arena/>) which will be a jobs fair but also where CD-ROMs will be distributed including most of the demos/tutorials/interactive tools presented there.

Studies show that these new methods of using technology for educating are successful and Dekker (1998) and McEnery and Baker (1998) are two cases in point for CL/NLP.

Large Language Engineering (LE) platforms for CL/NLP are becoming more prevalent such as CHAMELEON at Aalborg, Denmark,

GATE at Sheffield, England and the CSLU spoken dialogue toolkit at the Oregon Graduate Institute (OGI), Oregon, USA, so that now students and developers do not need to develop basic tools for sub-tasks like parsing from scratch. Students will more and more be given a thorough grounding in how to use such platforms to develop comprehensive applications such as spoken dialogue systems incorporating CL/NLP as part of more project-based education. The current trends towards using CL/NLP in MultiLinguality and MultiMedia will be addressed more. Most important will be a focus on the possible applications of spoken language technology including spoken dialogue systems, machine translation, personal data assistants, and other mobile communications platforms. The ability to work in groups is important for CL/NLP education and research and especially since it is seeing its home in relation to other communities such as speech which involves much interdisciplinary interaction and expertise. Courses should stress the theoretical as well as the practical, project work, and the ability to work in groups.

### 1.3 Employment opportunities

Many computing (e.g. Microsoft), electronics (e.g. Toshiba, NEC) and telecommunications (e.g. NTT, Nokia, Ericsson, Motorola) companies are now focusing on developing Spoken Dialogue Systems which will need to incorporate CL/NLP. It is clear that with the convergence of computing and communications spoken dialogue systems have a significant role. Human-computer interaction, mobile communications and computing will include many of the applications and products for spoken dialogue systems. Education in CL/NLP equips its graduates with very specific knowledge and skills which they may use to start their professional careers in a reasonably wide range of fields but in particular in the areas of spoken dialogue systems, MultiModal systems, and information extraction.

The process of CL/NLP as part of human language technologies reaching user communities is the object of the European-wide survey EUROMAP (<http://www.anite-systems.lu/euromap/>) which is funded under the Language Engineering sector within the Telematics programme of the EU. The survey which started in 1996 will pull together data on Language Engineering (LE) activities in Europe as well as actual user and market requirements. Based on this analysis, recommendations will be developed on how to link LE capabilities with marketplace opportunities. A view of employment opportunities in CL/NLP, mainly as part of larger speech systems, can be developed from an analysis of the job openings advertised via ELSNET, the European Network of Excellence in Language and Speech

(<http://www.elsnet.org/jobs/>).

#### 1.4 European dimension

There are a number of aspects which separate out Europe as having a distinct dimension in CL/NLP. The numerous cultures and languages of Europe impact on both research and education and this contrasts with the USA or Japan.

The diversity of languages in Europe means that there is considerable research on theories and computer systems for performing machine (aided) translation (e.g. systran, Verbmobil).

Also, there is research in software localisation, MultiLingual technical manuals, language identification and MultiLingual spoken dialogue systems. People working with software localisation and Multilingual technical manuals have discovered that this is not a simple matter of translating documentation from one language to another but that concepts and metaphors which are not the same across languages have to be translated too. Language identification is

useful for automatic telephone answering systems. Also, consider that a telephone answering/inquiry system would have to take into account pragmatic conventions such as the fact that in Germany one answers the phone with one's surname whereas in the British Isles one usually says 'hello?' In addition many people on the continent count years in weeks (e.g. 'week 42') rather than months (British Isles) and 'half eight' means 8.30 in the British Isles but 7.30 ('half of eight') in many continental countries. In fact the latter is often the cause of confusion and missed meetings. Hence, cultural and pragmatic conventions such as these have implications for the development of European CL/NLP systems as part of spoken dialogue systems.

There is also a diversity of educational programmes in Europe in terms of structure and content. Such differences across the cultures, countries and languages of Europe make education and research for spoken language engineering more difficult but perhaps also more interesting. Any specialisation in CL/NLP would help to bring together the variety of cultures/languages and education's in Europe.

Within the EU Framework V research funding for CL/NLP falls under 'Human Language Technologies (HLT)' the successor to 'Language Engineering' and is a sub-part of the Information Society Technologies (IST) programme (see <http://apollo.cordis.lu/cordis-cgi/srchidadb?CALLER=FRAMEWORK`5C>) which is within 'MultiMedia Content and Tools'.

Human Language Technologies are one of 4 objectives:

- (1) Interactive Electronic Publishing,
- (2) Education and Training,
- (3) Human Language Technologies ("HLT"),
- and (4) Information access, filtering analysis and handling.

They say the IST HLT programme would focus on advanced human language technologies enabling cost-effective interchanges across language and culture, natural interfaces to digital services and more intuitive assimilation and use of multimedia

content. Work would address written and spoken language technologies and their use in key sectors such as corporate and commercial publishing, education and training, cultural heritage, global business and electronic commerce, public services and utilities, and special needs groups. Work would also develop electronic language resources (e.g. dictionaries or terminologies) in standard and re-usable formats.

#### Research and Development

priorities include adding MultiLinguality to systems at all stages of the information cycle, including content generation and maintenance in multiple languages, localisation of software and content, automated translation and interpretation, and computer-assisted language training; enhancing the natural interactivity and usability of systems where multimodal dialogues, understanding of messages and communicative acts, unconstrained language input-output and keyboard-less operation can greatly improve applications; enabling active assimilation and use of digital content, where work would apply language-processing models, tools and techniques for deep information analysis and metadata generation, knowledge extraction, classification and summarisation of the meaning embodied in the content, including intelligent language-based assistants.

## 5 Conclusion and recommendations

Koenraad de Smedt and Paul Mc Kevitt

It is concluded here that the European CL/NLP community is in a healthy state of affairs with respect to education and research. There are a number of EU Socrates programmes within which CL/NLP are important and also CL/NLP has, and will play, a major role in research projects as part of the EU's Framework 5.

The role that CL/NLP plays in new applications such as personal communication devices will increase as will its links to speech and other modalities such as vision. It is clear that telecommunications companies already predict that the next generation of mobile phones will include screens with visual data as well as sound. Whilst focussing on all these applications it is important that CL/NLP does not forget that theory is also important and we would hope the balance between theory and practice is always there.

Old barriers between the Humanities and Science/Engineering will decrease as Engineers see the need for more linguistics and phonetics in their systems and Humanists see the usefulness of engineering for testing their ideas and theories.

With respect to education there will be a role for CL/NLP as part of degrees like the European Master's degree in language and speech but also CL/NLP may be interested in establishing a European Master's or Bachelor's of its own. If this happens then certification and accreditation will be important and just as it has been for the Master's in language and speech in which ESCA and EACL are involved.

Links between education and research will become more important as students will more and more need to use tools and platforms resulting from research but also results from student projects can feed back into research. Also, in this fast changing field it lifelong learning will be important where teachers will be able to keep abreast of the latest developments. The ELSNET summer schools are very useful in this regard.

CL/NLP has not had many relations with industry since it is even more removed from obvious real-world applications than speech. Also, it is difficult for industry to think of CL/NLP applications removed from the context of speech. CL/NLP will be able to forge more links to industry through its allies in speech and this will be the way placements are found for students.

With respect to European studies in computational linguistics we have a number of specific recommendations which are the following:

- \* groupwork and project-based education should become more prevalent in CL/NLP
- \* investigate how research and technologies in the Humanities and Science/Engineering can be brought closer together
- \* institutions should focus on making CAL and internet-based tools available for their students
- \* there is a need for a European Bachelor's or Master's degree in CL/NLP
- \* links between education and research need to be increased and this is happening already within the speech community as we saw above with the Education Arena at Eurospeech-99; maybe the same should happen at EACL meetings?
- \* MultiLinguality and Intelligent MultiMedia & MultiModality will become major application areas of not just CL/NLP but also spoken dialogue systems (this has been already agreed by the "speech communication sciences" network mentioned above)
- \* the CL/NLP community should focus more to see how their work can be integrated with speech processing and respective applications; CL/NLP cannot survive on its own

We believe that it will be necessary for computational linguistics to follow these recommendations in order to survive in a fast and ever changing world and in particular with convergence of the Humanities and Science/Engineering but also with the processing of natural language text and speech being seen very much as a part of MultiMedia.



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