

COOPERATION IN EDUCATION

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This paper describes the way in which a University Computer Science Department ~~can~~ cooperates with all who ~~can~~ aid in its obtain and gives cooperation in computing; and contributes to the objectives of improved understanding and use of computers, ~~outside the University.~~

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county Down (2009)

Cooperation in Education.

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C.A. R. Moore.

~~Any reader of the popular newspapers~~
I am honoured ~~at~~ ^{and pleasantly surprised} delighted at
the invitation to present this first talk
at ~~the~~ on Cooperation in Computing
at the sixth annual joint conference
of the British Computer Society and
Irish Computer Society.

I am delighted honoured because
it gives me ^{a little} a chance to describe and
(perhaps boast _^ about the way in the
Department of Computer Science gives cooperation
on many sides ^{to} (industry, government, research, and education;
~~in contrast~~ ^{widening and} ~~and~~ ^{to} ~~the~~
with the effect of ^{(improving} the understanding
of computers, and the effectiveness of their
use.

I am delighted, because it gives me the chance to convey my thanks for the even greater cooperation which we obtain from others; from industry, government, ^{and} other ~~univer~~ educational establishments, both ~~on~~ an international, ~~national~~, and ~~most of all~~

~~on a local base~~ This cooperation is on an ~~into~~ both international and ^{as well as} ~~national~~ ^{scale;} ~~but~~ ~~best of all~~ is most of all, we are grateful for the intense local cooperation which we obtain from many of you present at this conference today.

And finally, I am pleasantly surprised. The popular impression of a University is that of an ivory tower; populated by fuzzy-headed thinkers engaged in isolated contemplation of eternal verities. More recently, their ~~loves~~ ~~have~~ ~~been~~

contemplation has been disturbed by
 the actions of rebellious students; and pockets
 most recently ~~their~~ standards of living
 have been ~~attacked~~ ^{raided} by unsympathetic
 governments. My invitation to address you
 shows you do not believe this ~~picture~~ ^{illusion};
 and after my talk, I hope you will
 be even more convinced of its utter
 falsity.

But let me start with a quotation defining the ^(primary) objectives of a ^(modern) University; it is the pursuit of learning and scholarship; its advancement by research its propagation by education and its application to the needs of society.

~~I beg your permission to start with research~~

At the Queen's University, our main research interests are directed towards reducing the high cost of computer programming, and increasing the reliability, efficiency, adaptability, and reliability of computer programs. Much of this must necessarily be of a long term nature; our main source of funds is the Science Research Council of Great Britain; and our main collaborators are scientists in other Research Universities and Research

Establishments. But we do all our

work must be firmly based on the real problems of computing applications in data processing, scientific calculations, data bases, and the many fascinatingly similar but different applications of computers.

We are particularly fortunate that at the Queen's University (our Computer Science Department) has three members of staff with over eight years experience in professional industrial employment. Two other members of staff have obtained valuable experience by

visiting local industries like Harland and Wolff or Ulsterbus and the ^{very} ^(exceptionally) close contacts with

local industry which we have established with local industry (and employers) in Northern Ireland.

I will be returning to this point again and again; because I believe we have that the quality of our contacts is matched

nowhere it would be difficult to think in this point we match some of the best Universities in the United States, such as Stanford in California

Several of them have spent their efforts at the disposal of consultancy work for local industry in another most valuable contribution to cooperation, in a small application of the learning to the Society.

Finally, it is worth mentioning that one of our first research contracts was an investigation of Operating Systems Techniques, wholly sponsored by International Computers Limited. This was an excellent piece of research, and within two years, we had enough useful material to fill three books.

Unfortunately, ICL were not able to benefit from our research or our ^(resulting) advice in the design of their system B operating system; I regret to confess to believing that they would have avoided many of their problems if they had done so.

~~Let us ~~pro~~ continue with the theme~~ ⑧

Leaving the topic of ~~research~~
the advancement of ~~research~~ by learning
by research, let us turn to education,
the propagation of learning, both ~~to~~ among
students of the University and outside.

~~The~~ Starting with education outside the
University, this is an area of cooperation
in which we have started well, but
further development is possible. Our main
contributions here are in the improvement
of programming techniques by a method
~~to which~~ known as Structured Programming,
~~and which has been pioneered in the~~
~~Queen's Un~~ ~~on~~ which the Queen's University
has conducted some of the pioneering research.

I have given courses of lectures on this topic in summer schools in places as far separated as Santa Cruz California, Phoenix, Arizona, Cambridge, England, and Munich Germany. ^{In September,} ~~Last month,~~ I even went as far as Dublin, to address the Irish Computer Society. The fame of these courses has even spread to the Queen's University, Belfast, where last month Jim Welsh and his colleagues gave a very successful course to the programmers of the computer centre.

I believe that we have the ability on such courses to make a real contribution to an improvement in present-day programming practices; and so does the London firm Infotech, which has invited us next year to present six full-week courses on the topic of structured systems programming to

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those who can afford their highly
generous fees.

Next year too, we shall be
cooperating ~~with~~ the again with
the British Computer Society and
the Irish Computer Society in
presenting at the Queen's University
a symposium on Software Engineering
& which I most cordially invite you
to attend. The dates are

8-9 April 1976.

~~So much for the commercials.~~

In the longer term,
 I would like to arrange
 a series of short courses for
 experienced programmers and programming
 managers, to teach some of the
 techniques which ~~we~~ have ^{been} proved successful
 widely successful, and which we are
 already teaching to many graduates
 who are now entering the profession in
 Ireland. I am sure that many
 of their more senior colleagues will wish
 to find out for themselves if there
 is anything valuable which they can
 take over; and it is these experienced
 professionals whom we would wish to recruit
 to our courses. I would be most grateful
 to hear from anybody who would be
 interested.

I have left to the last, the first and most important area of cooperation, that of the education of our students, the computer professionals of the future,

~~The reason is~~ ~~And~~ ~~I~~ ~~the~~ ~~men~~ ~~are~~

~~Many of these students find jobs~~

~~the men and women~~ from whom

you will be recruiting your staff in the future, and many of you already have.

This is almost always an area of controversy, sometimes bitter controversy, between universities and employers.

I once ~~attended~~ spoke to a conference run by the Software Houses Association, at which the final debate session debated the motion

"That computer education at Universities is inadequate to the needs of Industry"

keenest request came from an English firm that had already employed two computer Society graduates from Queens. I had told them that all other graduates were already employed, and mostly by local concerns

It was passed; and it was passed unanimously - well, you don't think I would be the only one to vote against. ~~And this~~ ^{Nevertheless} Naturally, I took to heart everything of the greatest note of every criticism that was made against the universities; and we have made every effort to design our courses to meet these criticisms to the full. Although we are constantly trying to improve them still further, I think we have done a fairly good education

I would have been quite discouraged at my obvious ~~competence~~ incompetence in my vocation of education, if it had not been for one thing - every single employer that I met at the conference asked whether I had any graduates not yet employed; and the

Keenest request came from an ^(English) firm that
had already employed two of our graduates.
So I was quite glad to tell them the

Education in Computer Science.

A major factor in our success
has been the very high degree of
cooperation by local employers of programmers
in this province. Our Honours course
in Computer Science is arranged to
contain a full year's professional
experience before the final year's
study for honours. This benefits of
this for the students themselves are
immediately evident when they return to
us after the year away. More subtle
are the benefits to us, their teachers,
who can learn almost as much from the
experience as the students. Their
final year at the University

achieves something close the ideal of
the University since the Middle Ages,
the cooperation in the pursuit of
learning between the teachers and
the taught. ~~The course is a long~~

~~It is for this that we must~~

It is this cooperation between
universities and polytechnics and ^{outside} ~~industry~~
~~and~~ programming establishments that
is one of the most useful ways in which
we can help each other in the mounting
education of the computer professional
of the future; and it is for this
that I would like to express our
greatest appreciation to the employers who
even in a difficult economic climate have been
willing to take on an inexperienced recruit
~~and~~ for a period of a year; and sometimes
(I am glad to say) even chivalrously to let him
come back to us for a further year's study

completes his formal education

~~to complete his formal education.~~

~~And now I want to ask
yet another favour, that you, the
employers of our~~

But there is yet another way
we can cooperate more fully in ensuring
cooperation between education and
industry, between producer and consumer,
as it were, of that expensive product
the University ~~of~~ Graduate in Computer
Science. You see we have a grave
problem. We work for three years to
make this product; we send him it
~~as~~ out with a scrap of paper which
does not even purport to be a guarantee;
and we never see him it again. Then ~~the~~ It
must then function ^(continuously) ~~(correctly)~~ for the
next forty years, without even a return for

regular maintenance; and we can't even recall it for replacement of a defective part. And we have to do this on a syllabus ~~regular basis~~ like a production line, which takes many years to change or develop. And we have to do it in an advanced technological area, where we don't even know whether we have got the basic design right.

So why not ask the customer. That is exactly what I have done, and what I propose to do again. If there is anything which you think we should be teaching and we are not, please let us know; if there is anything that you think we should ~~not~~ be teaching that we should not, please let us know even quicker. And if you do not know what we teach, ask us; we will be delighted to tell you, or even to teach you.

2. USERS exchange of software & ideas & people.
staff personnel admin. User's association
Chamian

3. IN HOUSE service / relation between computer Dept
communication between & rest of firm.
computer people & their clients.

4. EQUIPMENT & Software between manufacturers
standardisation avoiding duplication
impact of users' needs.

5. FORUM. David Finberg NCC.

The way ahead.

OPEN UNIVERSITY

No 1. EDUCATION

Univ / School / Polytechnics / and Employers.
Manufactures / User in training / Infotech.
Education & Manufactures / Research
Consultancy / Media. Educated Public.
ACIP

Comparison with US. / Canada

Software engineering. Symposium.

~~I cannot~~

Basic themes:

- ① cooperation between ^(university) education and industry.
- ② overcoming the usual antagonism and difficulties.
- ③ relationship between academic study and practical experience in the making of a professional
- ④ The value of sandwich courses
- MAIN ⑤ The structure and objectives of our present course at Queens,
(Based on the enclosed article).
- ⑥ Request for comments by employers.
- ⑦ Possibility of post-experience courses for senior programmers and managers.