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Creating The Competent Engineer? An Evaluation of Integrated Graduate Development In Northern Ireland*

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A key to economic success is that organisations provide the conditions in which the engineering graduate can contribute meaningfully to the organisation. This paper describes an Integrated Graduate Development Scheme (IGDS) which was designed to facilitate these conditions. Its novel design was the result of collaboration between the two universities in N. Ireland, organisations and the State. The paper reports on the results of a comprehensive quantitative evaluation of an IGDS, which will be of interest to those academics and organisations who wish to design or use such a programme. The implications for integrated graduate development are that the N. Ireland IGDS meets the needs of all stakeholders and is a successful model for graduate development and the areas for improvement are the need for a more focused needs analysis of participants and the continued adjustment of the balance between the technical content and managerial content. Participants appear to value more the novel managerial inputs.

INTRODUCTION

IT IS axiomatic that taking a young graduate through a process of training and education to equip them to make an early meaningful contribution to a company's activities is a desirable aspiration. Barriers to the realisation of this however include short-term commercial pressures, cost, company commitment, and the difficulty in identifying suitable participants for such a programme.

In addition, it is becoming increasingly recognised that professional engineers need to undertake continuing professional development (CPD) beyond graduation to maintain their competencies within a rapidly developing technological environment. CPD has most been the subject of much public debate following publication by the Engineering Council of the Fairclough Report on Engineering Formation (August 1993).

This paper describes an evaluation of an Integrated Graduate Development Scheme (IGDS) with the objective of developing graduates to make an early contribution to company activity. The IGDS study contributes to meet the requirements of CPD. It was developed by the University of Ulster, Queen's University, Belfast and Northern Ireland employers and has run successfully since 1991, generating forty-six graduates with a Masters of Science degree in Manufacturing Technology, Design and Management. Of particular interest however are questions as to whether such activity adds tangible value to the participant and their organisation. This paper will be of interest to managers in organisations that are responsible for the effective utilisation of young graduates.

The summarised results of the study are presented in this paper. They are important in that they provide quantifiable evidence of the merits and demerits of such a programme. Implications for design of such programmes are identified. It is concluded that the programme broadly meets its aims and that further work needs to be done to solicit more data relating to participant's subsequent career progression and on the ultimate value to their organisations.

Results are given relating to:

- content, and relevance and contribution to personal development;
- learning gain on modules of study;
- the transfer of learning to the workplace.

Some preliminary data on organisational impact is presented.

ORIGINS OF THE IGDS

The need for a professional engineer's education to continue beyond graduation has been long recognised and more recently discussed in detail in two seminal reports [1, 2]. One industrialist, Brian Wolfson recently said that [3]:

> '. . . we live in a world where the shelf life of an engineer is five years—where the issue is not to be qualified but to stay qualified.'

Because of the diverse nature of engineering it is essential that such professional development be carried out with the full support of an individual's

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employer so that young graduates are most effectively equipped to quickly take up responsible positions within their chosen industries. In addition, academic institutions have a role to play in provision of advanced training to fulfil specific objectives for personal development as opposed to the more general education supplied at undergraduate level. Thus an integrated approach to professional development is required involving both employers and academic institutions in providing programmes tailored to the specific needs of individuals.

Integrated graduate development is a relatively new concept in industrially oriented postgraduate training at the Postgraduate Diploma/Masters Degree. The Integrated Graduate Development Scheme (IGDS) was set up by the Science and Engineering Research Council on an experimental basis in 1980 with four pilot programmes. Following a favourable review of the scheme in 1985 by the Institute of Manpower Studies [4] the Department of Education and Science gave approval in 1987 for the expansion of the scheme. In November 1987 universities and polytechnics were invited to submit proposals for additional IGDS programmes. Approximately 50 proposals were received including a joint submission from the University of Ulster and the Queen's University, Belfast. It was against considerable competition that this was one of those accepted.

It was necessary to solicit the active support and participation of a large and representative number of Northern Ireland companies. Examples include:

- Bombardier Shorts
- Ford Motor Company
- Northern Telecom
- Harland and Wolff
- Northern Ireland Electricity
- Desmond and Sons
- Sperrin Metals
- Redland Tile and Brick

Additional support came from the Training and Employment Agency (Northern Ireland's Training and Enterprise Council) and the Department of Economic Development, the then Science & Engineering Research Council, (now EPSRC) and the two universities. This degree of co-operation and participation bears strong witness to the interest in, and need for, such a provision within Northern Ireland. The evidence of need is further supported by the Department of Manpower Services (now the Training and Employment Agency) who stated that [5]:

> 'The attraction of new industry to N. Ireland can be facilitated by the availability of suitably qualified executives and the creation of new business in the Province can be influenced by the existence of a strong cadre of entrepreneurially influenced managers. An adequate supply of such managers must be largely generated within N. Ireland; the civil disturbances have not encouraged an inward flow.'

The design criteria for the scheme came from consultative meetings between organisations and academia. The criteria became the basis of the design of the scheme. Their appropriateness is reflected in the success of the bid for funding.

THE IGDS COURSE

Criteria for the design of the course included the desire to provide a part-time study route through provision of one-week intensive modules and to be able to flexibly serve the needs of a wide variety of individuals from varying industrial sectors. The course, which was believed to meet the criteria, is shown in Fig. 1.

Entry to the programme and enrolment on the Masters degree requires a good honours degree in engineering or a related subject as well as the support of the employer. Participants with a lower qualification supplemented by a length of industrial experience are also admitted following careful selection including interview. Such participants are enrolled on a postgraduate Diploma course, which runs parallel to the Masters degree but without dissertation, and with lower progression requirements. Satisfactory performance on the PGD will normally lead to automatic transfer to the M.Sc.

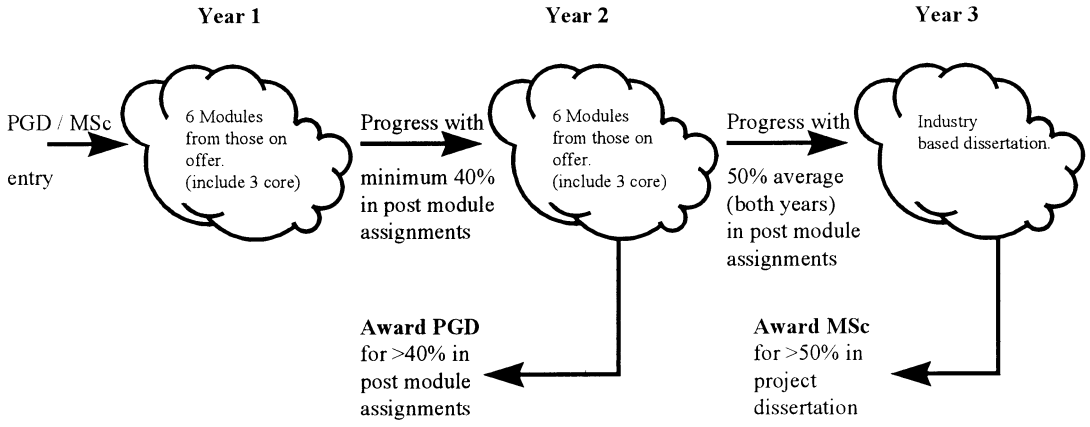

Fig. 1. Course design of PGD/M.Sc. in Manufacturing Technology, Design and Management.

In each of the first two years, participants take six modules. These include three mandatory modules and three optional modules chosen in conjunction with the sponsoring company. The mandatory modules are included in order to provide a core and ethos to the programme. In addition, they ensure that all participants will meet together and so develop a course identity, and the longer-term possibility of meaningful networking throughout the province the fourteen modules currently on offer consists of four management modules, with five from technology, four from technology and management and one from design. Details of module status and academic area are shown in Table 3. Some modules are seen to cover more than one academic subject area and participants are also permitted to take optional modules from similar programmes in other universities provided a suitable assessment regime is in place.

The participants and the study

Recruitment has been approximately 10 participants per year although in the first year there were 18. This level compares favourably with other schemes.

We were able to obtain feedback and information from the total population of participants. An employee of both small and large companies was represented as well as graduates from a variety of backgrounds and lengths of experience. It has been found that the programme is of interest both to engineers wishing to develop expertise and knowledge as well as graduates from other disciplines wishing to gain learning in technical areas and to better equip themselves for industry. In all cases participants have been highly motivated and driven by their company (who pay the fees!) to succeed. The male/female proportion reflects the proportion of women in engineering at present. 51% have a mechanical engineering related degree with 85% employed in a manufacturing company. 73% are in companies with over 200 employees. 94% have greater than two years experience in employment.

Evaluation design

A proposal for the evaluation of the programme was agreed by the Management Committee that has members from both universities and the sponsoring companies. The objectives were agreed as 'to validate the programme as it stands and providing an opportunity for improvements to be made. The evaluation will provide feedback on the system to stakeholders; academics, participants and training officers from participating organisations. . . .' [6]. It was further agreed that the main focus would be the evaluation of the impact on participants with data from lectures and organisations used or triangulation to validate the results.

Easterby-Smith [7] posits three general purposes of evaluation:

- proving, the demonstration that something has happened as a result of training and development activity which may be linked to a judgement of value;
- improving, the improvement of the programme such that it is better than it is at present and;
- learning, where the focus is feedback to inform the learning of the participant.

The study was aimed at proving, to justify the investment by companies in the programme, and on improving to ensure that participants received a worthwhile programme. Learning as feedback is not specifically considered. A framework which underpins this approach to evaluation is the five-level causal chain of training and development identified by Kirkpatrick [8] and Hamblin [9] in which:

- Level 1 leads to **reaction:** reaction measures how well the participant likes the programme, its content, the trainer, the methods used, and surroundings.
- Level 2 which leads to **learning:** learning assesses knowledge and skills and attitude gained.
- Level 3 which leads to **changes in behaviour:** the extent to which the learned knowledge and skills, and attitudes are transformed into behaviour in the workplace.
- Level 4 which leads to **changes in organisation:** measured on cost-related results or behavioural outcomes.
- Level 5 which lead to **change achievement of ultimate goals:** as shown in measures of organisational success.

The levels which were chosen as the main focus, were levels 1 and 2, reaction and learning, on the grounds that the academic staff could make changes within the programme to influence these two levels. While reaction measures are often denigrated as 'happy sheets' they have considerable value ranging from securing top level support to enhancing trainees' motivation to learn [11]. Learning is the knowledge and skills gained by the participants within the training environment contrasted to behaviour which is demonstrated in the workplace.

Behaviour and the other levels are strongly influenced by organisational factors ranging from opportunity to perform to strategic changes which may constrain the participant's ability to perform. As there was the opportunity during the study some broad measures of change at levels 3–5 were taken.

A focus on reaction and learning lead to an appropriate research method of the questionnaire with follow-up interviews. A 175-item questionnaire in 25 sections was designed. The five main sections (134 items) gathered biographical data, views on learning methods, on content, teaching, relevance to work, relevance to individual goals, an overall rating for each module and self-perception responses on knowledge and skills before and after

attendance on each module. In all cases a four-point Likert scale 4 to 1 is used on all questions where 4 is the highest score and 1 the lowest. The other 41 items were largely open-ended questions such as 'Have you been able to undertake more managerial responsibility as a result of the course?

A similar questionnaire for sponsoring companies largely substituted your 'participant' for 'you'. Academics and companies were interviewed about the course through a semi-structured questionnaire schedule.

The results that follow are taken from a full report available from the authors. The results presented in detail are those which have implication for higher integrated graduate development as compared to specific learning programme design.

RESULTS

Survey response

The response rate permits generalisation about the capabilities of participants and believes more caution is required with sponsored company responses. 78% (N = 42) of participants and 42% (21) of companies responded to the questionnaire. Structured interviews were completed with 38% (10) of participants, 24% (5) of sponsored companies and 57% (8) of academic staff.

Learning methods

Participants rated first local management speakers and expert speakers not from local organisations. Second as shown in Table 1 it appears that active discussion is the preferred learning method with case studies (4) and group discussions (6) rated highly. More passive learning methods, books, articles, and computer software score lowest. The fully participative methods of games and role-play also score low, a reflection perhaps of the need to maximise meaningfulness of material to the workplace [13], which comes more readily to the top rated methods. Games by their design are often abstractions of reality.

The rankings of the organisation responses are significantly different from those of the participants (Spearman's rank order correlation $\rho = 0.69$, $p < .05$). Organisations have common views on the lower ranking scores with games, articles, computer software, films/video and role-play being seen as less useful. There is a difference in the value of books where companies see them as more useful. The greater differences are in the participants top three learning source: local management speakers, expert speakers, and prepared course material. Organisations see the greater value in group discussions, lectures and self-analysis and reflection.

Implications for learning design in learning methods

There are differences in views between participants and organisation, and there are differing views of the value of learning sources disguised within the mean scores for host participants and organisation. Learning for adults is individualised and is based on past experience. It is important to provide a wide variety of learning sources. Methods that are less likely to succeed are games, articles, software, and books. Participants at this level need to be convinced about the need for active participation in role-plays and experiences (although organisations see their value). Participants value the outside speaker whereas organisations see a lower value. Is this a case of 'not invented here' by the organisation?

Reaction measures

Table 2 shows the views of participants on content, teaching, relevance to work and relevance to personal development. It is clear that those with high rankings across all criteria are worthwhile

Table 1. Values for usefulness of learning sources for participants and organisations

Learning source	Participants: mean score	Rank: participants N = 33	Rank: organisations N = 9
Local management speakers	3.90	1	9
Expert speakers	3.49	2	7
Prepared course material	3.33	3	8
Case studies	3.24	4	5
Summarised handouts	3.18	5	4
Group discussions	3.15	6	1
Lectures	3.12	7	2
Self analysis and reflection	3.12	7	2
Practicals/simulations	3.03	9	5
Exercises	3.00	10	9
Application projects	2.96	11	9
Role-play	2.84	12	15
Books	2.81	13	9
Films/videos	2.78	14	13
Computer software	2.75	15	15
Articles	2.5	16	14
Games	2.4	17	17

Table 2. Ranking of modules on content, teaching method, relevance to work and relevance to personal development

Module	Type		Content	Teaching method	Relevance to work	Relevance to personal development	Overall score average
Total Quality Management	Tech./ Mgt.	Option	1	1	1	1	1
Managerial Finance	Mgt.	Option	5	5	2	2	2
Industrial Relations	Mgt.	Core	2	3	4	3	3
Quality Assurance	Tech./ Mgt.	Option	3	2	6	4	4
Design Strategy	Design	Core	7	7	10	5	5
Maintenance & Reliability	Tech.	Core	4	4	7	6	6
Management Competencies & Development	Mgt.	Core	7	7	3	6	7
Operations Management	Tech./ Mgt.	Option	11	11	5	8	8
Information Systems	Tech./ Mgt.	Option	10	10	9	9	9
Robotics	Tech.	Option	6	6	12	10	10
Manufacturing Systems & Simulations	Tech.	Core	9	9	11	11	11
Machine Tool Technology	Tech.	Option	12	12	13	12	12
Computer Aided Design	Tech.	Core	13	13	14	13	13
Project Management	Tech/ Mgt.	Option	14	14	8	9	14

e.g. Total Quality Management and Industrial Relations. A pattern is that the management modules have generally high rankings. These modules are Total Quality Management, Industrial Relations, Managerial Finance, and Management Competencies and Development.

It appears that the participants find value in subjects which they have had little or no previous input. It is also likely that the relevance of management input is higher as participants reach a first management role.

Subjects to which participants have had previous exposure on degree programmes score lower rankings. Care must be taken therefore to ensure material presented is always relevant, applied and up to date. There is also the concern that participants may not believe they need further input. Modules which must have doubts on their value, are Computer Aided Design and Robotics (despite its relatively good teaching ranking).

Some modules rank both high and low. Operations Management scores weakly on content and teaching but is seen as relevant organisationally and personally. In this case it would be useful to explore the content which may be outdated compare to contemporary organisational practice where rapid change in organisational practice may be more advanced than academic knowledge. It is also possible that Operations Management has a strong situational relevance with what works in one company irrelevant to another making it difficult to provide a common content. Another modules with good content and teaching, Maintenance and Reliability, is seen as relatively irrelevant, which must raise doubts about its organisational significance.

There are strong Spearman's rank order correlation between content and teaching method ($\rho = 0.87$, $p < 0.05$). There are lower correlations between content and relevance to work ($\rho = 0.51$, $p < 0.05$) and to work to personal development ($\rho = 0.70$, $p < 0.05$). This pattern is reflected in the correlations between teaching method and relevance to work (0.44, not significant) and relevance to personal development (0.61, $p < 0.05$).

Implication for learning design on reactions

Content and teaching method are strongly correlated. Relevance to work and relevance to personal development are also strongly correlated. Other correlations are much weaker. The challenge for the learning designer is to provide a bridge between the two aspects. Need for accurate needs analysis at the organisational level is critical. The needs analysis must also involve discussion on programme content, for example, Operation Management is important to work yet the content is seen as weak. There is a missed opportunity for significant learning. Participants also can distinguish between good teaching and relevance as shown by the score for Robotics.

Learning measures

The measurement of learning gain is problematic as it is necessary to have accurate measurements of learning with pre- and post-training. Good design requires the introduction of a control group to test that learning gain is a function of the

course. The adapted approach which avoids test sensitisation is the 'before after' design where the 'before' are completed after the course along with the 'after' score to assist participants in the use of a common measuring scale.

Participants were asked to indicate their level of knowledge before and after on a four-point Likert scale from no knowledge (1) to very knowledgeable/skilful (4). Learning gain as measured by the mean changes and rank order of greatest learning gain is shown in Table 3. All gains were positive and are significantly different as shown by the t tests ($p < 0.05$) except for Project Management. Four of the top five in learning gain were optional modules. The course with the lowest learning gain was Project Management where participants had the highest 'before' score.

As with the reaction measure, the management courses range highly with five of the top seven management with Industrial Relations at number 8. The bottom four are technology or applied management with technology subjects: Project Management, Machine Tool Technology, Computer Aided Design and Operations Management.

The Spearman's rank order correlation between learning gains and module content is 0.534, and with the teaching method is 0.711. This strong relationship is not replicated in the correlation with work relevance (0.053) and personal development (0.349).

Learning implications on learning

The pattern of high rankings shown in the reaction measure is mirrored in the ranking for learning gain. The exception is robotics. It is important in CPD to be aware that novelty is valued by participants. The content for 'traditional' programmes such as Machine Tool Technology and Project Management need to be closely reviewed to ensure that they add value for the participant. The Spearman's correlation points to a link between learning gain and good teaching and content. This is not surprising. The lack of a correlation between gain and relevance points to the importance of organisational involvement in the needs analysis and to emphasise the importance of the topics that participants had met on their undergraduate degrees. It is also possible that organisations had not made sufficient use of the previously gained skills and thus participants believed that there is limited opportunity to transfer new skills.

BEHAVIOURAL MEASURES

Participants were asked to report within the questionnaire on changes in behaviour in the following areas: technical knowledge and skills, managerial knowledge and skill, attitude and priorities towards work, transfer of knowledge and skills and preparation for early or more responsibility. In addition nine participants were interviewed to elicit more detailed responses. The results below combine questionnaire and interview responses.

- **Technical skills and knowledge**. Sixty three percent of participants said they were able to undertake more complex technical tasks only to a certain extent, or not at all. One participant

Table 3. Participants' learning gain is ranked in descending order showing mean score before and after with number of participants

Subject area	Module name	Participants N =	Module status	Mean score before	Mean score after	Learning gain	Rank
Technology	Robotics	9	Option	1.55	3.11	1.55	1
Management	Managerial Finance	18	Option	1.83	3.28	1.44	2
Tech./Mgt	Quality Assurance	21	Option	1.90	3.24	1.33	3
Technology	Maintenance & Reliability	25	Core	1.92	3.20	1.28	4
Tech./Mgt	Information Systems	12	Option	1.75	3.00	1.25	5
Management	Management Competence Development	30	Core	1.77	3.00	1.23	6
Tech/Mgt	Total Quality Management	19	Option	2.10	3.31	1.21	7
Management	Industrial Relations	26	Core	1.96	3.15	1.19	8
Technology	Manufacturing Systems and Simulation	32	Core	1.81	2.97	4.00	9
Design	Design Strategy	25	Core	2.00	2.96	0.96	10
Tech/Mgt	Operations Management	27	Option	2.19	3.04	0.85	11
Technology	Computer Aided Design	31	Core	2.10	2.90	0.80	12
Technology	Machine Tool Technology	12	Option	2.08	2.83	0.75	13
Tech/Mgt	Project Management	21	Option	2.28	2.67	0.39	14

replied to this, 'No, should I have been?' Whereas, 35% of participants pointed out that they now had knowledge and confidence in areas they had not encountered before. Seventy-percent felt that the course was successful in ensuring participants were kept up to date with changes in design and technology. The others felt that the course only kept them up-to-date to a certain extent.

- **Managerial knowledge and skills**. Fifty-one percent of participants said that they had undertaken an increased managerial responsibility and had developed their managerial skills. The remaining 49% clearly indicated that they had not had such opportunity although they still felt their managerial skills had been added to.
- **Transfer of knowledge and skills**. Seven participants felt that they had definitely transferred the knowledge and skills they had acquired into their working environment, and could highlight specific cases of having done so. A further six felt that they had done so in some areas. Three more participants said that TQM was most useful in their work. Only three interviewees said that they had not been able to put acquired knowledge and skills into practice through lack of opportunity, and because of the nature of their work. All however, felt they would have the opportunity to use these skills in the future, when they change jobs or get higher up in the organisation.
- **Preparation for early or more responsibility**. There was a mixed reaction from the participants as to whether the course prepares graduates for early or more responsibility. Sixty percent felt that it definitely prepared graduates for more responsibility. The other 40 percent responded with a qualified 'yes' pointing out that the course gives participants insight in this area and in this way it lays the groundwork, but 'nothing can take the place of experience'.

ORGANISATIONAL IMPACT

The responses to changes in the organisation are from the sixteen participant interviews. The weaknesses inherent in self-report data make it difficult to draw definite conclusions on the impact on the participant's organisation. Many of the comments were from reaction and learning levels, and behavioural aspects.

A minority of participants felt that their organisations had not given them the opportunity to implement any changes based on their new learning.

Participants were asked how they had changed their management practice. 50% stated they had used a greater variety of management skills in their roles. The same participants felt they now used TQM to organise the workforce better. Also they were more knowledgeable about employment relations matters.

The responses in this section provide little evidence of organisational change. The responses do provide some further evidence for learning and behavioural change. What is required is that the changes are further examined to answer the question, 'What is the value of the learning and behavioural changes?'

ORGANISATIONAL RESPONSES

Organisations were asked to respond to a similar set of questions as the participants. There were nine respondents (42%). Many of the respondents were from training and development functions, which meant that there was limited direct knowledge and learning or understanding of the participants in their work role. Some respondents stated they had insufficient knowledge to respond to the questions on their perception of participant's reactions to content, teaching, relevance to work and personal development and to the change in knowledge and learning. Responses about behavioural change showed some changes in 'maturity of thinking' and levels of managerial responsibility. One respondent indicated that the participant was in a narrow technical role and had no opportunity to exhibit new behaviour. One must question the involvement of the participant on a course with such a focus on application of new knowledge, skills and behaviour.

The responses to questions on overall impact were less precise. None presented any significant evidence of specific impact on the organisation. Four participants were reported as having been promoted but as one respondent stated, 'We picked out people with high potential to attend the course so they would progress anyway'. There was some comment on the usefulness of the final year project but no information on its impact.

LECTURERS' RESPONSES

Eight lecturers were interviewed using a nine-question interview schedule. The positive aspects of IGDS were seen to be the energy and enthusiasm of the participants. The negative side focused mainly on the delivery mode that is a one-week module with nine hours input per day. Lecturers suggested that changes to the programme to make it better centred on the need to have closer involvement with the organisations were desirable. A particular concern was the sporadic involvement of company representatives in pre-module meetings and a desire to have in-company inputs to the programme.

DISCUSSION AND CONCLUSIONS

The results indicate a general satisfaction with the delivery of integrated graduate development. There are implications for programme design to meet the needs of the participants. The balance of passive learning as preferred by participants need to be balanced with employers' wish for more reflective learning. There needs to be more rigorous and focused training needs analysis of participants as shown by the results of the reaction; and learning questions. The need for module design is most important on modules that the students have had previous experience such as Project Management, Computer Aided Design and Machine Tool Technology. It is interesting that highly ranked content and teaching do not influence relevance to work and personal development. Behavioural changes have been demonstrated by over 50% of the participants in the areas of technical skills and knowledge, managerial knowledge and skills and transfer of knowledge and skills. There is limited information on organisational impact, and areas for future study. The organisational and lecturer responses provided limited information.

Academic staff and industrialists involved with the programme together have a wealth of practical experience in engineering and education and so should be able to produce a useful course with academic integrity and at the appropriate level. The results of the study are of interest because they represent an external and objective viewpoint. The course was not designed with a full, independent and proper needs analysis of prospective participants. It was based on the perceived needs from the companies concerned, supported by the academics' views of what constitute a coherent programme of study as reflected in the design criteria. The results provide, for the first time, an objective measure of where these factors may diverge from participants' actual experience.

Some of the results of the study were of particular interest to academics who either scored highly or who came near the bottom of the list following collation of the survey returns. It would appear that participants have a distinct preference for subjects which offer 'new' material rather than those which seek to develop further the undergraduate experience. This is perhaps understandable from the point of view that a reasonable perception might be that acquiring 'management' skills would add more value in terms of potential promotional prospects.

Nevertheless, when the evidence concerning actual impact of the programme in terms of changed behaviour and application in the workplace is considered, the reverse is found. Technical subjects like CAD have yielded much more direct and immediate return for the participants when tangible application is considered.

The question to be answered is therefore, 'Should the participants have entered a more standard MBA type of programme or were we right to insist on maintaining a high level of technical input?' At this point in time, we are strongly encouraged by both university and industry to support the latter. For this type of scheme with a high degree of industrial input, it is deemed important that participants take the medicine that is offered because it's good for them. In the light of the evidence, the medicine was made more palatable by changing the status of the CAD module to optional and substituting a new module on Design and Innovation.

Such are the tensions encountered whenever the nature of meaningful continuing professional development is considered. A decision should be taken for an individual as to whether it is more desirable to seek a deepening (leading to greater specialism) or a broadening of knowledge. It is argued in some areas that the broadening approach can yield great benefits as participants are exposed to a variety of new situations and knowledge domains leading to the possibility of innovation and cross-fertilisation. However, the practical reality will more likely often be driven by shorter-term objectives of employers who, after all, pay the fees.

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