

Appendices

A.1 Programme research projects

A.1.1A review of the current state and sustainability of in-company training in the Automotive Supply

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**A review of the current state and sustainability of in-company training in
the Automotive Supply Chain in East of England.**

Report for Project 1

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Abstract

As the first of a short series of projects focused on sustainable learning appropriate to SMEs in the automotive supply sector, this project seeks to provide a snapshot of training within the East of England. The indications from the literature are that 60% of large organisations embark on training without any contemplation of measures of effectiveness – more driven by the accepted wisdom that “training is beneficial”. To avoid gaining a false impression from the small and medium sized market, the project started by investigating a major manufacturer’s in-house training which prepared staff for working in small production teams. The resulting qualitative benchmark indicated that 50% of trainees showed no long term engagement resulting from their training. Of those that did, their degree of engagement was not related to their individual level of knowledge gained during the training.

This disparity between the intended outcomes of the training and the actual outcomes was emphasised even more amongst the group of chosen SMEs. Each had been selected for Lean Manufacturing training and had reported encouragingly about the effects of the training immediately afterwards. However, in the longer term the effects of training on the business were in many cases masked by the noise of the market and personnel activities.

The particular findings from this research are that there was no evidence of use or usefulness of Kirkpatrick’s level 4 evaluation in the SME environment; that funded training needs to take greater cognisance of the aptitude and attitude of potential trainees; that the role of in-company champion is pivotal for the successful implementation of training in the company context; that the effectiveness of training is grossly over exaggerated. Nonetheless there is evidence to show that even the overtly ineffective training does impinge on the organisational culture and prepare staff for changes.

A review of the current state and sustainability of in-company training in the Automotive Supply Chain in East of England.

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Foreword

Addressing the skills and competitiveness needs of the companies in the Automotive Supply Sector is a vital part of the industry's strategy for survival. (Bevis 2001) Whilst there are a few large suppliers the majority in the East of England are small to medium sized enterprises, SMEs.

The research starts from the viewpoint that the most effective learning that can be delivered into an SME is unlikely to a simple extension of other forms of learning. It seeks to uncover the context in which company based learning takes place and within that context to develop an appropriate learning model. The work has been framed into four projects.

The first of the two exploratory projects seeks to look at current training and educational provision across the region in terms of sustainability. It questions the extent to which current provision of learning experiences provide sustainable outcomes. The basic premise is to investigate companies that have received training a year ago and measure the extent to which that training is currently having an impact on the business.

The second project looks in detail at what owner/managers want from their investment in training and what skills and expertise the OEMs require them to acquire. Partly this project will be a GAP analysis determining whether the voice of the SME is being heard by commercial providers and Government. As in the first project attention will be paid to the potential learning environment and how this differs from classroom, lecture theatre and home.

These first two projects are to provide the evidence to support the theoretical developments in the third, which looks at the theoretical models for learning. The final project is the design of a learning model that can be tested. The thesis will bring these four projects together to provide a researched contribution to the training debate within the Automotive Supply Sector.

1. Introduction and Background

1.1. *The Automotive Climate for Manufacturing*

Across the whole of the International Automotive Industry during the last twenty years quality had been the key to winning orders. Of late productivity has become the major battleground across the industry and quality has fallen to the rank of a hygiene factor, a necessary condition to allow a supplier to sit at the table.

McKinsey (McKinseyGlobalInstitute 2005) found that the leading productivity process innovations centred around "Lean Manufacturing". The real starting point for them was their weak financial position. Ford started after its serious financial performance around the 1981-82 recession. GM, being financially more stable at that time did not engage with "Lean Manufacturing" until 1992 when the Gulf War recession hit. It took 10 to 15 years for the "Big Three" (Chrysler, General Motors and Ford) to catch up with foreign competition.

From 1987 to 2002 GM managed a 38% drop in hours per vehicle. 59% of this change was produced by the introduction, learning and adoption of Lean Manufacturing. The remaining 41% included new product introduction (13%), a new common platform (3%), and outsourcing of assembly tasks to suppliers (17%). The introduction of new features cost 2% of the benefits from these changes. Finally plant closures secured 10% of the change. The challenge of lean manufacturing is that it brings a substantial benefit, far outweighing a number of other initiatives, but at a much slower rate. Each of the "Big Three" have taken over fifteen years to roll out these changes across the whole of their organisations (McKinseyGlobalInstitute 2005).

The beginning of the twenty first century has found parts of the UK Automotive Supply sector in a fragile and nervous state. Vauxhall and Rover have been the two most recent examples of upheaval amongst the vehicle builders. There already was overcapacity in the market. Financially the sector was under pressure both from the distant markets and from within Euroland. Not only had globalisation brought more companies into the market, it had broken the tie between the customer and the natural local suppliers.

1.2. *The UK Industrial Background*

The DTI has repeatedly highlighted the lack of competitiveness in the UK Automotive Components Sector (Andersen 1995). This had concluded that UK firms were being put at a competitive disadvantage by a shortage of suitably qualified engineers. That need has been reiterated time and again. The skills shortages and skill gaps at all levels within companies are a major factor in the UK's lack of competitiveness. Even the methods of tackling these shortages have come in for criticism. The Japanese component firms surveyed in 1998 (DTI 1998) criticised UK companies for a lack of emphasis on practical skills, the use of old-fashioned equipment and teaching methods.

“Not only did the evidence show a need for training, it also showed a reluctance on the part of the Small to Medium sized Enterprises or SMEs¹ within the supply chain to engage in training. Whilst the main disincentive might be seen as finance, it was not the only one. For an SME, the burden of having to manage training or rather to manage and sustain the business whilst engaging in training can be too much. For these disincentives to be overcome the benefits to the business have to be very clear and measurable.” (Bevis 2001)

In 2002 the Automotive Industry Growth Team report recognised that the UK was on the one hand achieving record car production levels, but on the other hemorrhaging profits and becoming less dependant on a UK supply base (Gibson 2002). Whilst the work of SMMT Industry Forum² was held up as an example of good practice, its penetration into the automotive supply chain has, to date, only reached 450 companies.

¹ The European Commission defines a Small to Medium sized Enterprise as an enterprise that employs less than 250 persons, has an annual turnover not exceeding EUR 25 million and/or a balance sheet total not exceeding EUR 43 million. For a small business these limits are 50 employees and EUR 10 million. A micro business employs fewer than ten people and has a turnover or balance sheet not exceeding EUR 2 million.

² The Industry Forum, a division of the Society of Motor Manufacturers and Traders, SMMT, was established in 1996 with the aim of achieving sustainable world leading competitiveness in the UK based vehicle and components industry. Its engineers were trained by Master Engineers from the major players in the industry. These Industry Forum engineers would then transfer the skills, knowledge and delivery techniques of the tools of process improvement into the companies with whom they worked. This was the

Against this background and in line with the automotive climate for manufacturing the key training area is that of lean manufacturing. Womack sets “Lean” in the context of automotive manufacture (Womack et al. 1990). “Lean is seen as specifically supporting the company’s ambition to be competitive” (Lewis 2000).

With the loss of vehicle manufacturing at Luton, the local market has reduced to only the niche vehicle OEMs in the region. Whilst these manufacturers of sports or specialist vehicles have technical requirements every bit as demanding as their mainstream counterparts, the difference is in the quantities of vehicles produced and the rate of that production.

This research has concentrated its attention on the East of England Region of the UK. Within this region at the end of the twentieth century and at the beginning of the twenty first, there have been three sources of support for industrial training. These are company financing, National Government support via the Department of Trade and Industry (DTI) and European funding through the European Social Fund, Objective 3 Programme (ESF Obj. 3). In some small specifically defined areas Objective 2 funding was introduced as well. OEM based training that forms the first part of the primary data has been funded by General Motors for its own employees. The second part of the primary data is based on training with SMEs which has been totally funded by the European Social Fund, through initiatives focused on the Automotive Supply industry in the East of England Region.

1.3. The Training Focus

Greater detail on the methodologies of training will surface in the third project of this programme. Here it is just worth commenting on the type of training that has become the focus of the research, the primary approaches used in that training and the measures of performance that can be used. In a very general sense the twentieth century has seen a shift from instructionist approaches to education to more constructionist approaches. The cornerstone of this approach is Piaget who brings together previous theories about how

essence of the “**Learning by doing**” programmes developed by the Industry Forum. (SMMT Industry Forum website)

children learn and argues strongly that children learn more by exploring and doing than by being told (Piaget 1924). This emphasises the activity of “finding out” – exploring and so constructing solutions or constructs which are the learning. Kolb also builds on the work of Piaget and Dewey to develop the idea of four learning styles which will be used in later projects of this programme (Kolb 1984). Of more concern here is his notion of the Learning Cycle where the learner moves through a sequence from having an experience to reflecting, then abstracting and finally experimenting in new situations as shown in Figure 1.

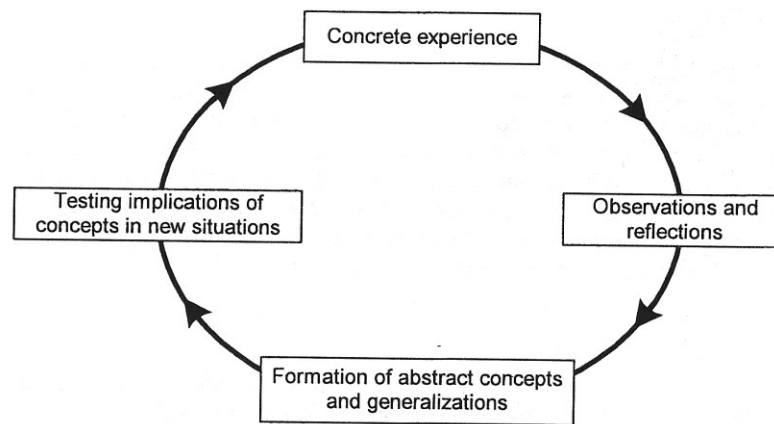


Figure 1 The Experiential Learning Model derived from the constructivist, Kurt Lewin, by Kolb (1984)

The freer exploratory methods of school do not necessarily fit into the rigours of in work learning which has meant that much industrial training had followed the instructionist approach. Lean Manufacturing has lent itself to a more constructivist approach. The Confucian proverb of “I hear and I forget, I see and I remember, I do and I know” appears in the mantra of SMMT Industry Forum’s training.

Knowles is a key figure in the development of adult education in the United States. His particular contribution is to identify the differences that occur with age. He sees adult learners as having more life and work experience than young people (Knowles 1998). In the situation of adult learning, those constructs, mentioned above, already exist.

If we are to assess the sustainability of training, we must look at the methods of evaluation. Human Resource Development professionals will talk of evaluation levels, nominally one to four, although some will concede a fifth. These numbers refer to work introduced by Kirkpatrick in 1959, built on by Hamblin and Whitelaw in the 1970s and restated by Kirkpatrick in 1994.

Kirkpatrick had identified four levels of evaluation as emotional, mental, physical and financial. The emotional level represented the learner's attitude toward the course. The mental level covered the tests that might be carried out in the class. The physical level looked at how the learning might have been transferred to the on-the-job environment. Were skills being implemented? Finally the financial level was concerned with the additional perceivable changes in the organisation as a result of the training.

Hamblin and Whitelaw discussed this notion of evaluation levels in the 1970s. In his final writing on the subject, Kirkpatrick introduces a division in this last level into two, one for performance and one for financial outcomes.(Kirkpatrick 1994) Despite the frequency of use of Kirkpatrick's four levels in the training industry, there is little evidence of a firm correlation between the four levels. Alliger (Alliger 1989) argued that Kirkpatrick's model may never have been meant to be more than a first, global heuristic for training evaluation and questions the underlying assumptions.

The earlier discussion points to an opinion in both political and media circles that productivity and competitiveness can be improved by further investment in training and developing skills. In a review of the existing research on the Return on Investment, ROI, in this area in 2002, Keep, Mayhew and Corney compared the UK Europe comparison with the UK USA comparison. Workforce skill might contribute to the UK's poor performance compared with mainland Europe, America also has higher productivity than the UK while its workforce is no more highly skilled than our own (Keep 2002). Their second pertinent point concerned two studies in the UK that linked training with profitability. One showed a

positive link between IiP³ and profitability. The other found no link between training and profits in SMEs (Keep 2002).

From detailed research across a set of over three hundred companies, Amos was unable to find a direct causal link between investment in training and company performance. In fact he puts it quite bluntly, “what is apparent from this study is that currently the relationship between education, training and development is not blindingly apparent”(Amos 1997).

The first of the two exploratory projects in this research programme seeks to look at current training and educational provision across the region in terms of sustainability. It questions the extent to which current provision of learning experiences provide sustainable outcomes. The basic premise is to investigate companies that have received training a year ago and measure the extent to which that training is currently having an impact on the business. The particular training that is most pertinent to the automotive industry is training in elements of “Lean”. This subject is core to the OU course on Supply Chains. It is the key component of the training delivered by the SMMT Industry Forum. Industry Forum was developed after the same DTI report (Andersen 1995) that spawned Automotive College. Automotive College was the mechanism that provided the researcher with a very practical introduction to the state of the automotive industry in the East of England. “Lean” is a key component in the Automotive Academy’s curriculum. The experience of Toyota has made “Lean” a “want to have” company skill.

2. Aims and Objectives

The introduction has provided a background both internationally and regionally to the issue of training. This project sits within a wider programme focused on developing a model of sustainable learning appropriate to SMEs in the automotive supply sector. As this project is the first in a series four projects in the programme, its aim is limited to gaining an understanding of the effectiveness of in-company training as experienced by the

³ **IiP** represents the **Investors in People Standard** which provides a framework for staff development within an organisation. Companies attaining an IiP accreditation have demonstrated that they have systems in place to train and develop their staff.

automotive supply sector. The conclusions of this project and of the programme as a whole will be relevant to the wider manufacturing sector.

To gain the necessary understanding at least as a snapshot of the industry in the region, the following objectives form the basis for activity within this project:

- Using a controlled group within an OEM and the theoretical models of training assessment, provide a benchmark for sustainability of training
- Review the experience of a number of companies who have taken part in the training made available with ESF funding through the ASPEN⁴ project.
- Using the benchmark, compare these experiences to find common themes
- Recommendations for improved sustainability

3. Research Questions

In researching the current state of training, a number of questions come to mind. How do companies decide on their training needs? How committed are managements to the notion of training? Is there a strategy? How important are cost, location, time? How well is training performance and its sustainability measured? It is this last question that is at the core of this project. The context can be set by the CIPD's⁵ own reviews of training and development. In its 2004 survey, under the heading of coaching its respondents indicated that

- 75% used coach's evaluation of the programme
- 37% assessed programme against its objectives
- 25% assessed programme against business performance

(Kearns 2005)

A survey in People Management, reported by (Reid 2004) suggested that over 60% of the Human Resources Directors in the UK's top 100 companies do not have any realistic

⁴ ASPEN, Automotive Support Programme for the East of England, is explained more fully at the appropriate point in the text.

⁵ CIPD is the Chartered Institute of Personnel and Development, which is the professional body for Human Resources and Training in the UK.

measures of the return on investment that they are expecting from their training. Similarly, (Wigham 2003) reported that only 36 per cent of HR departments in the public sector bother to map training effectiveness against job performance. This concurs with earlier work in the USA where Olsen (Olsen 1999) commenting on a 1996 survey concluded that 60% of training does not transfer to the job. With all the available training technology it is estimated 80%-90% of the training and development interventions that are applied within business and industry have no measurable impact on organisational objectives (CET 2005). It is this lack of clear evidence amongst large enterprises that raises further questions about what can be expected from SMEs that engage in training.

This project seeks to look at current training and educational provision across the region in terms of sustainability. It questions the extent to which current provision of learning experiences provide sustainable outcomes. Whilst the data collection will not be trivial, the basic premise is to investigate companies that have received training a year ago and measure the extent to which that training is currently having an impact on the business.

4. Methodology

As outlined in the introduction the area of Lean Manufacturing has been shown to provide the largest contribution to improved productivity and hence competitiveness in the Automotive Industry. Hence whilst the majority of the literature on training, skills and the transfer of training is generic, this project is focused on training that is specifically designed to support the implementation and maintenance of lean manufacturing. In order to investigate the effectiveness of training in this area, two sources of primary data have been chosen, one to suggest a benchmark and the second to test that experience.

Given the perceived weakness of Kirkpatrick's four levels, the methodology has been to identify from the literature a set of characteristics of training good practice and using those characteristics to select a single instance of training where there is sufficient data to provide a benchmark reference when looking at the East of England's recent experience with SMEs.

4.1. Benchmarking Reference

Although the intention is to use a reference organisation as a benchmark, this should not be confused with the many definitions of benchmarking activity. Two contrasting, but useful definitions appear on the HM Revenue and Customs/Cabinet Office website related to benchmarking.

"Benchmarking is the continuous process of measuring products, services and practices against the toughest competitors or those companies recognised as industry leaders (best in class)".

Source: The Xerox Corporation

"Benchmarking is simply about making comparisons with other organisations and then learning the lessons that those comparisons throw up".

Source: The European Benchmarking Code of Conduct

For this project it is this second definition that explains the purpose of selecting a benchmarking reference. The project is not setting up a regular comparison process to implement improvements.

The choice of benchmarking reference has been based on selecting an instance of training that has the characteristics to support a transfer of skill. Olsen (Olsen 1999) listed a supportive culture, reinforcement and coaching, skills practice and the need for the design of the training to simulate the job conditions. Others mention employee intention, organisational acceptance and supervisory support (CET 2005). Alzalabani (2005) identifies the desire to learn, the conviction about the importance of the training, the perceived opportunity to practise what has been learnt and management support. From these desirable attributes the following have been chosen to provide a minimum set for the reference benchmark:

- Management commitment to the importance of the training.
- Training that simulates the job environment and tasks.
- Ability of trainees to practice the skills.
- Supportive culture in the organisation.

To this list is added the expertise and track record of the trainers. The one feature omitted which appears in the literature is the intention or desire of the employees to learn. This

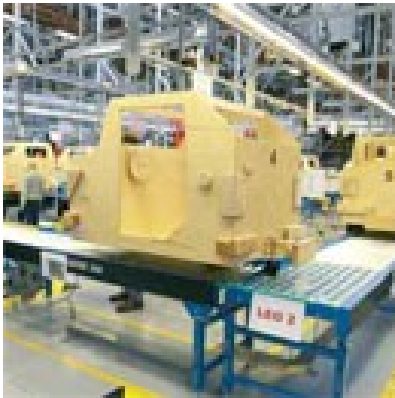
feature will be revisited in the later projects of this research programme. A programme that fits the selection criteria is the Simulated Work Environment, at IBC Vehicles Limited, Luton.

4.2. *The Simulated Work Experience*

IBC is part of the GM organisation and as such benefits from a long and established training regime focussed on lean manufacturing. With international experience dating back to 1987, the internal experience within GM should provide a reasonable basis for a benchmark reference.

Whilst separate from the Vauxhall operations in Luton, IBC is part of the GM

Fig 2 The SWE Workshop



organisation. In common with many other sites across the world, IBC has recently (2004) installed a Simulated Work Environment, SWE, with which to train staff in the common practices of their automotive production line. These practices are underpinned by the principles of Lean manufacture and in particular continuous improvement.

The SWE features two parallel production lines kitted out just as the main line on the factory floor. The product passing along these lines is a plywood vehicle onto which the workforce must add particular ancillary components such as lighting clusters and steering wheel. The simulation provides staff an opportunity to gain an understanding of the way in which IBC's production lines are run. The training introduces the concepts of standardised work, visual management and the Andon⁶ system, so as to give staff the confidence to act as full members of their teams back on the shop floor.

The training runs for a full shift and all staff complete a pre-training and post-training evaluation form as part of the exercise. From this early measurement, it is clear that staff

⁶ On the production line the Andon system provides a direct connection between the operator, the production line automation, the conveyor systems and the factory wide enunciator. When a problem manifests itself, the operator can stop the line and call for support. This is a vital communications system for management of the human/machine interface.

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are gaining knowledge and feeling more confident to engage in the workplace. The training started in July 2004 and the logical next step is to see whether the training is having an impact on the performance of the factory as a whole.

Comparing this activity with the criteria set out in section 4.1. above the SWE training at IBC satisfies the conditions to be used as a benchmark reference. The management commitment is demonstrated by the investment in the training facility and the allocation of staff time to the training. From a tour of the factory it is evident that the facility is identical to the factory environment, with the obvious exception of the simulated product. The structure of working cells within the factory provide the learners with further experience to practice what they have learnt when they return to their normal activities. All supervisory staff have been through the same training and so can be expected to be supportive to new members of their cells. The trainers are experienced both in their training and their knowledge of the General Motors ethos.

By contrast to the focus of this research programme the training at IBC runs across an OEM; however, the scenario provides an insight to training for members of small teams for the following reasons:

- There is a strong emphasis on “Lean” throughout IBC’s training programmes.
- The same training regime was in use across all participants in IBC.
- There were pre and post training checks
- The post experience check involved implementation within a manufacturing cell.

The number of similar programmes run by the same staff has allowed the comparison of experience of a number of staff and their ability/willingness to take that training back into the small working environment of the cell. The intention has been that this should develop a useful benchmark reference for studying the SMEs in the second part of the research.

There are two separate objectives to be met. The first is to update the information already collected by the pre- and post- training evaluations conducted by IBC.

The second objective is to gain an indication of the degree of transfer that is taking place and if possible to identify any major inhibitors.

The method is to collect data from two sources. The first source is the original pre- and post- training evaluations for the first 200 employees to pass through the SWE training. A third evaluation was distributed to those same people. This picked up on the original questions and the researcher used comments as an indication of the level of transfer.

The results have been anonymised as far as IBC management are concerned. It was only necessary to have sufficient information about the individuals to be able to track them across the three sets of data, i.e. to match post experience data with the individual's pre and post training data.

Whilst the researcher handled the analysis of the questionnaire, IBC distributed and collected the questionnaires. All participants were advised of the purpose of the research and reassured that their personal details and opinions would be kept confidential. The research findings will only be incorporated into further research activity with the express permission of IBC. The questionnaire is attached as an appendix to this document.

4.3. The SME Group

By contrast the second source of primary data was a small sample of companies chosen from within those who participated in the European Social Fund funded support for automotive companies in the East of England over the past three years. "ASPEN, **Automotive Support Programme for the East of England**, evolved out of work instigated by the Luton Vauxhall Partnership, a group of public sector bodies that co-operated to support activities for workers and supply companies affected by General Motor's decision to cease car production at their Luton plant." (Cranfield 2004) This has ensured that the companies all had identified training needs at the beginning and that there was a reasonable baseline for the level of training provided.

The common features for the companies that make up this second data source are that they:

- Are SMEs based in the East of England region of the UK.
- Are suppliers to the automotive industry.
- Have been identified through their relationship, in the past, to either IBC or another major vehicle manufacturer.

For the ASPEN project each engagement began with a diagnostic activity – a questionnaire, a visit, a facilitated discussion; these three forming the basis of a report which was presented to the senior management to gain commitment. No training intervention was commissioned without this vital element of management commitment.

To complete the questionnaire, a representative sample of staff was brought together and briefed on the process. They were introduced to the EFQM Business Excellence Model and asked to complete its associated Rapidscore questionnaire (BQM 1999). Rapidscore is a software package for conducting a Business Excellence Model assessment. The software had been selected and funded by the Regional Supply Network but the researcher designed the implementation process to suit the ASPEN project, reducing the intended one week workshop to two manageable half day sessions.

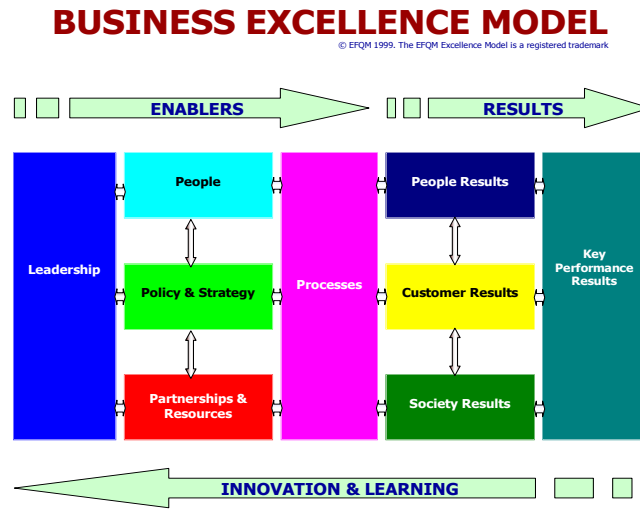
During this initial meeting, Industry Forum engineers or other members of the project team toured the site to gain a qualitative view of the company. Where possible this was to be augmented by any of the seven measures⁷ (DTI 2000).

The second of the two half day sessions was used to present the staff group with their aggregated questionnaire results. The facilitated discussion was used to tease out the specific reasons for any wide differences in responses. A final report based on the consensus view and the project team's own impressions was presented to management to select the most appropriate training and gain commitment for any following training intervention.

Initial feedback, of a more general nature, has been gleaned from the “end of project” report that marked the official end of the ASPEN project (Cranfield 2004). This was conducted independently and its purpose was to determine whether the project had delivered value for money.

⁷ The seven measures are a series of standardised measures which can be applied to a manufacturing operation, in order to express its efficiency in a meaningful way. A brief description is available at <http://www.autoindustry.co.uk/features/qcd>. Appendix I includes the DTI Factsheet, which also points to the same DTI reference as used in the text. The DTI reference details each measurement and its use.

Figure 3 The EFQM Business Excellence Model



More focused telephone interviews were conducted with companies' senior management to follow on from broadening to cover issues of staff turnover, management buy-in and state of the market. The questions are related to those explored in Research Questions, above, but by using semi-structured interviews the respondents would be encouraged to provide further detail about this training experience.

The purpose of the structured interviews was to unearth the reasons why particular training experiences in the SME environment have differing outcomes, i.e. to determine the contributory factors for successful training. The starting point for structuring this outline was Kirkpatrick's four levels of reaction, learning, behaviour and results. This has been further informed by work with companies, survey results and reading in the areas of Government initiatives, learning organisations and motivation.

Within each interview there was to be a certain amount of basic data collection. This included sources of funding, the timing, the provider, and details about the trainees. The intention was to gain from the interviewee an understanding of the organisation's reasons for training, both strategic and practical, its commitment to the training, a sense of the ethos within the organisation and a sense of the external environment in which it is operating. The selected companies were all involved in some form of Lean manufacturing training, but it was still important to determine exactly what type of training was employed and whether there had been any need for further Basic Skills training to support the activity. The key intended outcomes of the interviews was to have learnt the extent to

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which the organisation's had employed any of Kirkpatrick's Levels 1 to 4 outcomes. A lower key measure of acceptable training would be if the organisation would be prepared to engage in any repeat exercise.

The actual question structure used to hit all elements of the investigation is outlined in table 1. The individual questions were only used as required to stimulate conversation and ensure that the target information was obtained.

Table 1 Questions used in structured interviews

Question Areas	Potential individual questions
Why training?	<p>What were the strategic reasons for embarking on this particular training activity? Were the roots in any form of company wide internal or external audit? Business Excellence Model, IiP, Skills audit or Training Needs analysis.</p> <p>What particular training needs were identified? What information was to hand to link particular training provision to that need?</p>
The Environment?	<p>What was your commitment to this training? What was the commitment of the management team?</p> <p>Was the organisation's trading environment conducive to training then and is it still so now?</p> <p>Was there any external funding available to support your training? Was effect did the training have on the effectiveness of your organisation whilst the training was in progress and how did you cope with any adverse effects?</p> <p>What is your understanding of the peer pressures on the trainees and do you recognise these pressures as support or inhibition to the training's effectiveness?</p>

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<p>The Training</p>	<p>What type of provider was used to deliver the training and where? (Learning centre, hotel or company site)</p> <p>Were your trainees treated separately or with those of other organisations? Was that separation or mixing beneficial?</p> <p>Was there a qualification available at the end? Did your trainees achieve it and do you see that as a desirable outcome?</p> <p>Was the training suitable to your particular needs?</p>
<p>The Trainees</p>	<p>What was the level of training of your staff before the exercise?</p> <p>Were there any staff with basic skills needs, which would require the training to be handled in a substantially different way?</p> <p>Would it be possible to sample the staff involved to test their own recollections of the training?</p>
<p>The Outcomes?</p>	<p>What were the trainees' reactions to the training itself? Did they indicate initially that they had found it useful? Was this fed back to the trainer?</p> <p>What measures were used to determine whether the trainees had absorbed the information from the training?</p> <p>What evidence is available now that they have put into practice what they had learnt?</p> <p>Given the changing economic environment, is there any way in which you can see whether the training has had any long-term effect on your business? How does that effect compare with the actual cost of providing the training?</p>

	<p>Of the measures that were undertaken, to what extent were the results passed to the trainer/provider, the funder or your own HR/Training managers?</p> <p>Would you consider more of the same training and/ more training from the same provider?</p>
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The initial intention had been to analyse the interviews using the “affinity diagram” technique in order to bring out themes and then compare with benchmark findings. In the event the comments from respondents could be grouped under the headings in the table above.

5. Findings

5.1 Findings from the Benchmarking study at IBC

IBC are training between 100 and 200 staff per month on their one day SWE programme. The Programme is one-day acclimatisation for the production line environment and awareness raising on some of the basics of lean manufacture. Knowledge is tested before training and after training. This research looked at a further questionnaire that staff have been invited to complete two months after the training. This latter questionnaire tested for knowledge and implementation.

Three hundred and twenty sets of results are available for analysis. (There is potential for deeper analysis beyond just this project.) Before analysing the results as presented by IBC, it is important to recognise the inherent problem posed by the scoring method. In the questionnaire the numbers 1 to 4 are used to codify the level of understanding achieved:

- 1 = No Knowledge
- 2 = Basic Knowledge
- 3 = Good Knowledge
- 4 = Fully Competent

5 = Able to assist and guide others

Clearly this is an ordinal scale as “Fully Competent” is not twice the achievement of “Basic Knowledge”. Thus calculating the mean scores is only of limited use (Reid 2003). Despite this problem of definition, it has been possible to classify individuals on the basis of their mean scores (maximum = 4.0) and the difference between the three stages. To make sense of the scoring, only high or low scores should be considered.

The first conclusion, again recognising the problem with “scoring” has been that even though 94% gain some knowledge during the course, approximately 60% of test scores fall after two months. Of most use has been a study of the comments made by the individuals on the “after two month” questionnaire. These particular respondents were first grouped by change in score across the course and then by the change from course end to the post experience two months point.

An initial review of the results showed that at one extreme where the individuals’ scores had not changed significantly as a result of the course, the later comments were weak regardless of the final score. At the other extreme people whose scores had changed during the course, had more to say after two months regardless of whether their score had moved again. These differences are summarised in Table 1.

Table 2 Extremes of comments relating to scores, taken from initial review

post-pre change	Two month – post change	Examples of comments
0	0	Good understanding
	2	Good, but do not see it in action
1	-1	Interesting – informative
	0	Value lost as there is no implementation
	1	Need for more communication between shifts
2	0	No action on highlighted problems
3	-1	SWE is well worth doing as it gives people on the shop floor a say in how things can be done. Gained a better understanding of production.

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The first of the two benchmarking conclusions are that in areas where training is imposed and not chosen, more than half the attendees may not achieve a degree of implementation. The second tentative conclusion is that training is likely to be more effective if it is set at a level that is increasing the knowledge of participants, but this needed further testing.

Of the 527 employees who took part in the training during June, September and October 2004, 322 responded to the request to complete the delayed questionnaire. The more useful results came from the 131 of these questionnaires which included comments on the use of the techniques learnt in their workplace. These comments were classified under three headings:

Superficial - These comments were bland and gave no indication of the degree to which the respondent was engaging in the techniques or understanding their usefulness in the workplace – **33 responses**

Relevant – These comments showed that the respondent was relating the learning to the workplace, but not going further than that – **70 responses**

Engaged – These respondents showed that they could use their learning and reflection on the Simulated Work Environment to form the basis of their comments on conditions and activities in the workplace. These comments included both action comments and commentary on the efficiency or efficacy of the activities in their environment – **28 responses**

These results were then segmented in three ways, firstly as the numbers in each group receiving certain scores, secondly the average scores recorded for each group and finally as the frequency of scores appearing in each group. Table 3 shows the numbers in each group stratified by their changes in scores. Table 4 shows the numbers in each group classified by their final score only.

Table 3 Groups of comments segmented by changes in test scores

“Pre” to “Post” change in test score	“Post” to “Final” change in test score	No comment	Superficial	Relevant	Engaged
<1.1	0 - 1	115	20	36	20
	1 -2	4	0	1	0
	2 - 4	0	0	1	1
>1.9	0 - 1	8	3	7	0

Table 4 Groups of comments segmented by final test scores

“Final”	number	No comment	Superficial	Relevant	Engaged
4	30	18	3	5	3
3-3.9	212	124	25	46	17
2-2.9	8	48	4	17	8
1-1.9	4	1	1	2	0

A χ^2 approach was used to analyse the figures in Table 4. From a χ^2 table with three degrees of freedom (we have four categories, so 3 df) at $p = 0.05$, we find that a χ^2 value of 7.82 is necessary to reject the null hypothesis (expectation that the distribution within any class is the same as the distribution across the whole population). So our values of χ^2 less than 1.0 confirmed the initial impression that segmenting the results in terms of final score made little impact on the distribution of the comments.

An alternative view was to segment the sample by comment group and record the averages scores within each group. These are shown in table 5. The almost constant values from each set of questionnaires agree with the χ^2 result on table 4.

Table 5 Average scores and changes in scores segmented by comment group

Group	“Pre”	“Post”-“Pre”	“Post”	“Final”- “Post”	“Final”
No comment	2.4	1.0	3.3	-0.1	3.2
Superficial	2.4	1.0	3.5	-0.1	3.3
Relevant	2.3	1.0	3.3	-0.1	3.2
Engaged	2.6	0.7	2.8	0.0	3.2
All	2.4	1.0	3.3	-0.1	3.6

The final comment is being used as an indicator of learning being embedded in operational activity. Using this “implied measurement” there is no indication that those who seemed to gain the most from the training have gone to contribute more into the operational setting. The proportion of learners who show evidence of engagement in the workplace is similarly distributed across each scoring band. The small changes that are evident are ruled out by the χ^2 test.

These two analyses suggest that the effectiveness of the training that is evident from the factory performance is less dependant on the individual’s own learning achievement and more on other issues such as the organisational culture.

5.2. *Findings from the SME study based on companies in the East of England*

Sixty-four companies took part in the ASPEN project. Of these, thirteen engaged in some form of lean manufacture training. The post project report particularly notes:

“13 companies undertook training activities that were focused upon taking cost and time out of their production processes, mainly delivered by MAS staff [*Manufacturing Advisory Service*] and the University of Hertfordshire’s Automotive College personnel. This activity generated considerably the greatest proportionate number of beneficiaries as the training activities typically involved groups of shop floor personnel who where given the skills to understand “lean principles” and then supported as they implemented appropriate activities within their own specific work environment designed to cut out non-value added activity.”
(Cranfield 2004)

The reason for including this quote is that it represents the equivalent of the “pre-post” comparison of the IBC experience as an independent researcher working on behalf of EEDA collected this information from company participants. Looking deeper into the company reactions at this point, eleven of the sixteen companies surveyed acknowledged directly that they had experienced business changes or improvements as a result of the training. (The surveyed group was wider than just those that undertook some form of Lean

Manufacturing training.) Two were positive but unsure and the remaining three thought it too early to comment. This positive view is supported by some of the recorded comments:

“We’re getting through jobs more quickly and effectively. Reduced turnaround times for each job and we do a better job.”

“Increased abilities and awareness. People can do something they couldn’t do before. Staff confidence and the way they look at things has improved. The time spent in management meetings greatly reduced – process flow and productivity improved.”

“Our deliveries on time are higher and our levels of rejects are lower. Positive impact. Part of the whole package of business improvements and the general trend has gone the way we wanted it to go.”

Quotes taken directly from the post project report (Cranfield 2004)

More recent telephone interviews with the owner managers or directors of these companies reveals a wider range of post training experience. These include:

- *“In company groups there were often members of staff who felt they had already had the training and did not need a repeat. There would also be novices in the group.”* This relates partly to staff turnover.
- *“Training had identified members of staff who were not up to the training nor the company’s longer term plans for their development.”* The intervention had been used as a substitute for Human Resource planning.
- *“In the SME environment, the outcomes of the training may need to be adapted to the actual situation in the company to complement other development activities.”* This was a good example of double loop learning (Lewin 2005).
- *“The evidence of implementation and company benefit is poor.”*
- *“Outcomes of the training were not directly measurable simply from a lack of measurement or appreciation of measurement prior to the training.”* This affects use of Kirkpatrick’s level four evaluation. Outputs tended towards being “better tracking” of defects.

In the worst-case example, it had been noted that peer pressure had inhibited any staff engagement. Even the trainer had reported unproductive sessions. However, the research revealed that the staff had absorbed the underlying knowledge. When other initiatives in the company introduced elements of lean manufacturing, the staff were more supportive of the changes than expected. This is similar to the “interesting/informative” comments in the IBC programme.

6. Analysis

It is useful to set the IBC experience in the context of the SME questionnaire used after the ASPEN project. This analysis is structured to mirror the areas of discussion used with the SMEs.

6.1 Why training

GM and consequently IBC has a tradition of Lean Manufacturing training and implementation, which for GM goes back to 1987(McKinseyGlobalInstitute 2005). Many of the tools and concepts introduced in the SWE workshop can be found throughout the IBC site and not only on the shopfloor.

The ASPEN project was itself a response to a number of Government sponsored reports that identified the lack of training as a significant inhibitor to the UK’s competitiveness. (Andersen 1995),(DTI 1998) and (Gibson 2002). It was also a specific response to the imbalance in training support funding across the UK.

6.2 The environment

IBC’s commitment to training was evidenced in the capital investment required for the SWE workshop and the provision of dedicated full time staff.

SMEs, typically, are individual concerns with little shared purpose. However, all thirteen of the companies that received Lean Manufacturing training had undertaken the same diagnostic process. Lean Manufacturing training was only offered to companies with recognised operational weakness, highlighted by both the visit and the facilitated

discussion, and where the senior management made a commitment to support the training initiative.

6.3. *The Training*

IBC were using full time subject experts as the trainers. Having taken part in an SWE workshop the researcher can confirm that the trainers were, as a group, a proficient and encouraging training team. Individual members had different strengths, but the SWE required different roles during the workshop.

For ASPEN, the researcher was part of the trainer selection. Trainers were selected mainly on proven track record and their commitment to train rather than subcontract to a further level of unknown trainers. The type of training varied between classroom presentation for large groups to coaching for smaller groups or individuals. In all cases the learners were tasked to complete their learning during their normal working day. This was monitored through the financial recording system used to justify the level of European Social Fund financing. Classroom only teaching would have given an uneconomically low level of beneficiary time⁸ and thus reduce the amount of funding that could be claimed.

Neither IBC nor the managers engaged in the ASPEN project made any specific request for a formal qualification to recognise the training. In each case the objective was improved performance in the organisation's operations.

6.4. *The Outcomes*

The transnational application of SWE workshops in General Motors would only be countenanced if the training were perceived to be delivering a benefit to GM. In the light of the earlier evidence about the understanding of training outcomes in major companies, the emphasis has to be on "perception". Amongst the ASPEN SMEs, the initial perception again is that the training delivered the required outcomes.

⁸ Beneficiary time is the full cost of employment of staff for their time devoted to the training. When a project is funded by the European Social Fund, the funding represents only a fraction of the total project cost. The remainder must come from other sources and the investment in time from the beneficiary organisations. This method of accounting is intended to ensure that a project is delivering its committed outcomes.

The longer term finding from the research in both cases is that the optimistic perception is not supported by evidence and that, moreover, there are a number of noise factors that would mask such evidence if it were to exist. In the case of IBC, less than half the respondents to the final survey made any comment about the usefulness of the training to their workplace environment. For the SMEs it was the training itself that generated an understanding of the usefulness of measurement. The volatile nature of their markets meant that any longitudinal measurement would be disrupted by noise.

In the cases reviewed, the trainers used various forms of Kirkpatrick level 1 and 2 evaluation. Partly this was necessary to demonstrate that the training had indeed taken place. There was no evidence of any level 3 or 4 evaluation – no objective evidence that trainees had acquired new knowledge that could be recalled at the end of the course and certainly nor that any implementation had been either successful or effective after any settling time had elapsed.

7. Conclusions and Recommendations

The conclusions of the research are drawn from the comparison between the benchmark (IBC) and the interview (SME) findings in the light of the associated literature. This research has reviewed the experience of a number of companies who have taken part in training within the ASPEN project. By comparing the IBC experience with the post-ASPEN telephone survey, the common themes can be summarised as follows:

- When training is imposed there is a strong possibility that at least half of the participants will not engage. This suggests the risk that a major proportion of an SME's training budget, or even Governmental funding to support SME training is likely to be wasted, unless other specific safeguards are brought in. The general safeguards common to the use of Public Funds are only sufficient to ensure open and transparent financial dealings. Any definitions of "Value for money" are short term. The notion that much of the expense on training is currently wasted is the least attractive conclusion of this research and so needs to be addressed in the later projects of this research programme.

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- SMEs may be using third party training as an independent staff appraisal tool. This points to the need for Human Resources support not just training needs analysis based on Company need.
- When training is based within a supportive regime with an in-company champion at hand, there is the potential for double loop learning. (Schön 1978) This also requires the training provider to be very aware of the company situation.
- There is a need for follow-on training to refresh knowledge and keep the subject alive. However, the engagement at this point may be more difficult.
- There is also evidence of training providing a trickle effect, developing a background understanding that can be harnessed to support other change initiatives. (Both senses of trickle: 1 -only a fraction of the intended outcome, 2 - constant repetitive and small.)
- There is a reluctance to engage in meaningful measurement of longer-term outcomes. This is due, in part, to a lack of understanding of what could be obtained from quantitative measurement and lack of knowledge of measurement systems. Perhaps more importantly, the volatile nature of the business environment makes the accuracy or meaning of any measurements suspect. This suggests that any training is less effective than advertised.
- The final conclusion questions the usefulness of Kirkpatrick's level 4 evaluation, there having been no evidence of any attempt to collect data in this area. At best SME managements were recognising the need for performance measures in their companies which were more than just the routine financial reports.

The recommendation from this stage of the research is that training for SMEs needs to be planned and customised not just for the company but also to take into account the particular staff development needs.

- There are a number of diagnostic tools available for determining the state of a company and assisting in the selection of appropriate interventions including training. These range from the EFQM Business Excellence Model to BusinessLink's Gross Value Added Model. The question to be picked up in Project 2 is whether these company focused models take a sufficiently Human Resources view of the company to enable it to optimise its training budget. Project 2 will look at the connection between skills, learning and innovation. Its

starting point will be a summary of the training needs within the region as seen by the employers and informed by other research. (This initial objective from Project 1 now fits more logically within Project 2.)

- Further specific work is required to look at the methodologies to be used, taking into account the needs of SMEs, the needs of their adult learners and the characteristics of the subject matter, e.g. Lean Manufacturing.

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