

**SWP 2/02**

**ENHANCING LEARNING OF OPERATIONS  
MANAGEMENT WITH A MULTIMEDIA  
CASE STUDY**

© Lane, R.

Dr Robin Lane  
Operations Management Group  
Cranfield School of Management  
Cranfield University  
Cranfield  
BEDFORD  
MK43 0AL  
United Kingdom

Tel: +44 (0)1234 751122

Correspondence regarding this paper should be addressed to Dr Robin Lane.  
E-mail: [robin.lane@cranfield.ac.uk](mailto:robin.lane@cranfield.ac.uk)

*The Cranfield School of Management Working Paper Series has been running since 1987 with nearly 500 papers published so far. The aim of the Series is to bring together research in progress from across the School for publication to a wider audience and to facilitate discussion. Papers are reviewed by senior faculty before acceptance into the Series. The agreement of the authors should be sought before referring to its contents in other publications. This paper is available electronically on the School of Management website:  
[http://www.cranfield.ac.uk/som/research/working\\_papers](http://www.cranfield.ac.uk/som/research/working_papers)*

***Editorial Board***

*Editor: Dr Michael Butler*

*Managing Editor: Mr Andrew Kirchner*

*General Editor: Professor Alexander Kouzmin*

## **Author Profile**

**Dr Robin Lane** Robin started his career in research and development in the food industry before graduating from Brunel University in Mechanical Engineering in 1979. He then worked in Production Engineering for a short time before moving into Production Planning and Control, first with Edwards High Vacuum and then with Esselte Letraset. Robin moved to Cranfield University in 1988 to pursue his interest in planning and control systems and completed a masters degree in Management Science and Computer Applications. He then spent six years with The CIM Institute researching improved systems architectures to support production scheduling in a MRP II environment; working with a major systems company and a number of manufacturers. Following this period of research Robin worked as an independent consultant and then as a senior lecturer at the University of Hertfordshire before joining the School of Management at Cranfield University in 1998. His current research interests centre around co-location of suppliers with customers within supply chains and effective use of information systems to support planning and control.

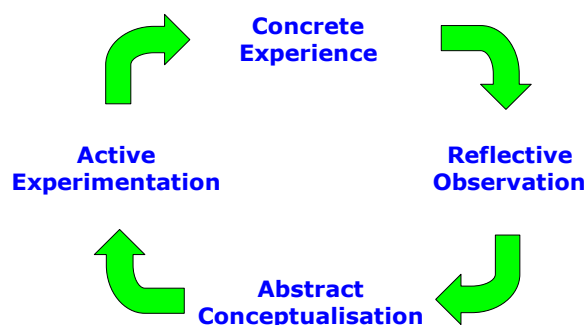
## ENHANCING LEARNING OF OPERATIONS MANAGEMENT WITH A MULTIMEDIA CASE STUDY

*This paper describes the initial use of a multimedia case study on the Operations Management course within the MBA programme at Cranfield School of Management. It presents the rationale for selection and introduction of the case, along with feedback obtained from students over a period of two years. Whilst the initial feedback was positive overall, it featured polarisation of opinion on the usefulness of the multimedia format in facilitating study of the case content. Consequently, the questionnaire was extended in order to research possible causes of this polarisation and inform future decisions on case design and course design. Feedback from the second cohort of students confirmed the polarisation of opinion, but did not reveal any link to the two chosen variables of student age and their level of familiarity with computer-based multimedia materials. After reviewing this second set of feedback, the paper presents another potential cause and the direction chosen for future research. Whilst the polarisation of opinion has not yet been explained, sufficient feedback has been gathered to support some useful conclusions about ways in which case studies can be enhanced with multimedia content.*

### Introduction

Since the late 1980s the possibility of using multimedia to enhance learning materials has drawn increasing levels of interest. However, actual usage of multimedia has been slow to spread, despite the potential impact of the technology. This situation seems to have changed since 1995 and though Hoare's portrayal of a race for adoption might be over-enthusiastic (Hoare, 1998), multimedia is entering the precincts of leading educational establishments such as Harvard Business School (Mullich, 1997) and Stanford University (*Information Today*, 1998). Another early adopter is the Darden School at the University of Virginia, which is reported to have deployed multimedia successfully both in simulations and in case studies (ECCHO, 2000).

Case studies have been used for many years to facilitate the learning of business management (Erskine et al, 1998). They enable students to move on from simply memorising concepts to develop a deeper understanding through practising the application of concepts to real business situations. In relation to Kolb's (1984) learning cycle, case studies enable students to move on from 'abstract conceptualisation' to 'active experimentation' by attempting to fit various concepts to the situations in the cases. In discussion with peers and tutors they gain some experience of the degree of fit/suitability of these ideas and can then move on to reflection, modifying their understanding of the concepts and their application.



**Figure 1:** Kolb's learning cycle.

Multimedia case studies facilitate a richness that cannot be achieved with paper—bringing the case to life (Bickerstaffe, 1998). This is particularly important, as students' identification with

the business problem is crucial to maximising the learning (Maufette-Leenders, Erskine and Leenders, 1997). Consequently, a multimedia case study was introduced into the MBA Programme at Cranfield School of Management in March 2000. The case study—*Nokia Mobile Phones: Supply Line Management* (Heikkila, Vollman and Cordon, 1998a)—was developed by the International Institute for Management Development (IMD) at Lausanne and was winner of the 1998 *efmd*<sup>a</sup> multimedia case award. It was the first multimedia case to be used within the Operations Management (OM) core course at Cranfield.

The next two sections of this paper review the reasons for using the case and describe the initial survey conducted amongst students. The fourth section then reviews the results of this survey, whilst the fifth section presents the relevant conclusions—indicating that students thought the case met the chosen teaching objectives. However, the results also revealed polarisation of opinion on whether the multimedia format made it easier to study this case compared with a typical paper case. Consequently, a second survey was conducted with the next cohort of students in 2001. This was done to confirm the existence of the polarisation and start to explore the reasons for its existence. Described in the sixth section of the paper, this survey included additional questions to identify whether the polarisation of opinions was a result of student age or familiarity with multimedia materials.

The second set of results confirmed the suitability of the case and the polarisation of opinion on the multimedia format. However, neither student age nor familiarity with multimedia materials appeared to be causal factors. Therefore, the penultimate section of the paper suggests further possible reasons for this difference of opinions regarding ease of study. It also presents the line chosen for further research. The final section summarises conclusions regarding the initial use of this multimedia case study within an MBA core course.

### **The course and the case**

The OM core course consists of twenty classroom sessions, each 75 minutes long, with a further three sessions devoted to student project presentations. The general pattern for the course was to use one classroom session to cover theory and then in the following session to apply that theory to a case study. This pattern was varied through the course, sometimes a case study was discussed before the relevant theory and sometimes theory was explored by means of practical exercises. The course included eleven case studies in total—ten in standard paper format and one in multimedia format—supplied to each student on a CD-ROM. The paper case studies used came from a variety of sources and included Southwest Airlines (Hallowell and Heskett, 1993), Codan 2000 (Pederson and Evans, 1997), and International Decorative Glass (Barker, Klassen and Beamish, 1997).

There were several reasons for selection of the Nokia Mobile Phones (NMP) multimedia case study. First, it involved the increasingly important topic of Supply Chain Management, which was one of the key topics in the Cranfield OM core course. Second, the NMP case featured a global manufacturing situation with significant regional differences in markets, thus covering a number of issues related to the management of an international business. Third, it focused on relationships between organisations in supply chains and was hence a useful complement to another case study that was used to cover basic issues including inventory management (Lane and Sweeney, 2000). Fourth, the case was relatively recent, covering NMP's situation in 1996, and fifth it represented a novel case format for the students.

These reasons alone would have justified its selection for the course. However, an additional factor was the potential for the video content to enable students to become more 'involved' with the case. This facilitates adoption of the deep approach to learning in which students reflect on the basic meaning of concepts, rather than the shallow approach in which they simply focus on memorising information in order to pass an exam (Ramsden, 1992). Brief clips of

---

<sup>a</sup> European Foundation for Management Development.

manufacturing processes were included in the case study, but the main video content consisted of interviews with senior managers describing supply chain issues and their responses to them. These provided plenty of opportunity for students to reflect on their own attitudes to these issues and to develop them further—a typical contribution of case teaching (Heath, 1997).

A significant risk was involved in deploying the NMP case study within an MBA core course. Its usage was significantly different from that described by the case authors at IMD. They used it with executives attending short courses who then continued to study once back at work. This required asynchronous communication, simulating the normal business environment complete with its need to search for the information necessary to make decisions (Heikkila, Vollman and Cordon, 1998b). At Cranfield the case was used within the much longer MBA course. This is a high-pressure course on which there is a great deal of reading to do, including numerous case studies. The students expected to find the information they needed fairly quickly—without too much searching—in order to progress rapidly to analysis. They were also accustomed to highlighting and annotating printed text.

### **The first survey**

Students' views on the NMP case study were sought by means of a short questionnaire, the design of which aimed to confirm whether the case successfully met the learning objectives associated with the selection criteria described above. The questionnaire was split into three sections. Section A contained three questions that used a 5-point Likert scale to ask students to rate the *insight* that the case content gave into three supply chain management issues.

- The complexity of managing a global supply chain.
- Examples of supply chain management practice.
- The importance of managing supplier relationships.

Section B of the questionnaire contained another three questions that used a 7-point Likert scale to ask students to rate the *impact* of the multimedia format on.

- Identifying with management issues in the case.
- Understanding the complexity of NMP's supply chain management task.
- Studying the content of the case.

In Section C students were asked three free-format questions. These concerned the *most* and *least* useful aspects of the case, and whether there were any other comments they wished to make. The questionnaire is contained in Appendix 1.

56 students out of 206 returned this initial questionnaire—a response rate of 27%. 2 of the 56 did not answer all six of the initial 'rating' questions and 2 others did not respond to the three 'free-format' questions. The next section of this paper presents the survey results graphically and as direct quotes. Most of the evaluation of these responses is left until the subsequent section.

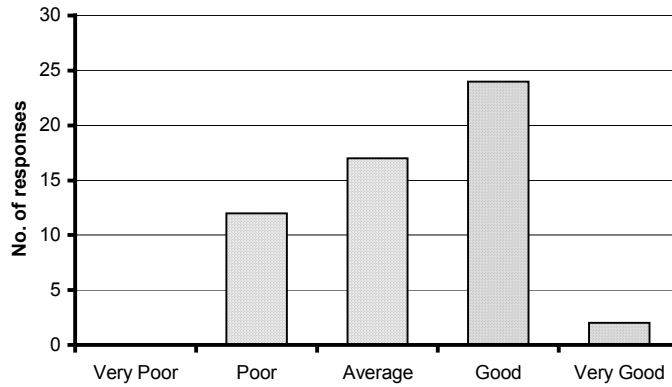
### **Results from first survey**

#### *Section A—case content*

In this section of the questionnaire, students were asked to rate the case content in terms of the *insight it gives* into three issues, each of which is covered in a separate sub-section below.

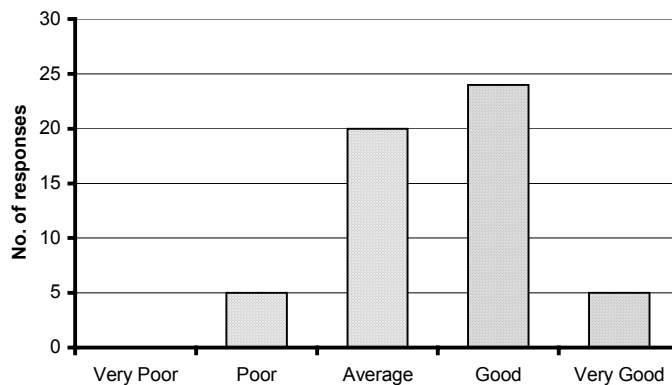
#### *Q1) The complexity of managing a global supply chain*

Assigning numerical values of 1 for 'Very Poor' through to 5 for 'Very Good' yields an average of 3.3 with a standard deviation of 0.85 from 55 responses. Although 3.3 is closest to a rating of 'Average', it does indicate that overall the case was considered better than average for giving an insight into the complexity of managing a global supply chain.



**Figure 2:** Responses to question 1.

*Q2) Examples of Supply Chain Management practice (eg joint problem solving, information exchange)*

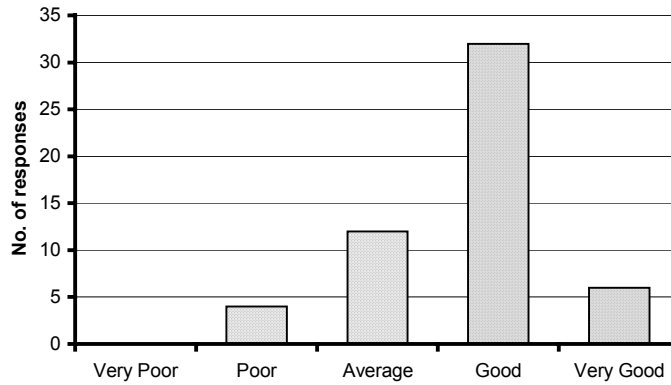


**Figure 3:** Responses to question 2.

Using the same numerical scale gives an average of 3.5 with a standard deviation of 0.79 from 54 responses. 3.5 is midway between ‘Average’ and ‘Good’ and represents a clearer indication that students considered the case better than average for providing examples of supply chain management practices. Only 5 of the 54 responses rated it worse than average.

*Q3) The importance of managing supplier relationships*

On this issue the numerical average is 3.7 with a standard deviation of 0.75 from 54 responses. This result is closest to ‘Good’—with 32 of the 54 students actually rating it as ‘Good’ and a further 6 rating it as ‘Very Good’. It represents a clear indication that these students considered the NMP case to be better than average for providing an insight into the importance of managing supplier relationships (a most encouraging result as this was a primary reason for selection of this case).

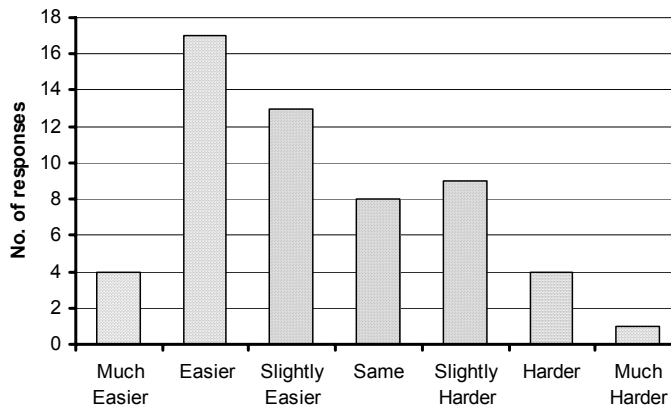


**Figure 4:** Responses to question 3.

*Section B—case format*

The second section of the questionnaire asked students to rate the *multimedia format* in comparison with a typical paper case: whether the format made it easier or harder to accomplish various things. Again the responses to each question are presented in a separate sub-section below.

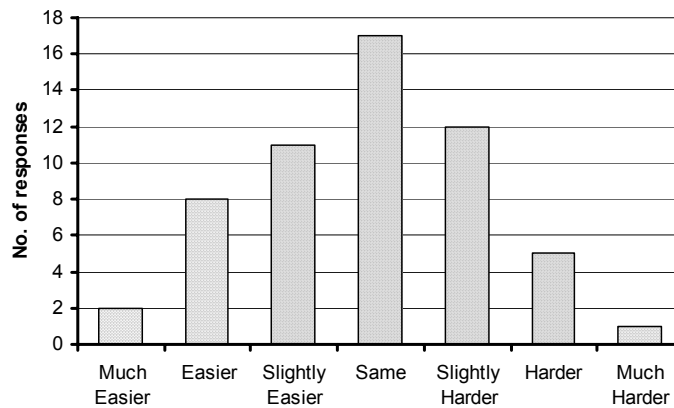
*Q4) 'Identify with' the management issues involved*



**Figure 5:** Responses to question 4.

Assigning numerical values of 1 for 'Much Easier' through to 7 for 'Much Harder' yielded an average of 3.3 with a standard deviation of 1.49 from 56 responses. This numerical average lies closest to the rating of 'Slightly Easier'; suggesting a small improvement compared with typical paper case studies. Figure 5 shows some split of opinions, with the distribution skewed towards 'Easier' but with a second small peak in the responses of 'Slightly Harder'.

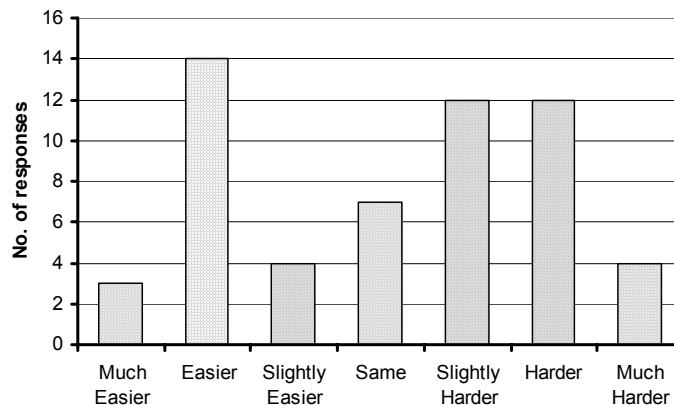
*Q5) Understand the complexity of NMP's supply chain management task*



**Figure 6:** Responses to question 5.

Using the same numerical scale as for the previous question yields an average of 3.9 with a standard deviation of 1.34 from 56 responses. Numerically this is very close to a rating of ‘Same’, and Figure 6 shows a spread of results that closely resembles a Normal distribution around this rating. Thus the format of the case had little impact on students’ understanding of the complexity of the task.

*Q6) Study the content of the case*



**Figure 7:** Responses to question 6.

Responses to this question yielded a numerical average of 4.1 with a standard deviation of 1.80 from 56 responses. Again this is very close to a rating of ‘Same’, but here we have substantial polarisation of opinion. There are two clear peaks in the responses and a significant dip in between. Half of students, 28, felt that the multimedia format made it harder to study the NMP case than a typical paper case, whereas 21 felt the format made it easier to study.



### *Section C—general*

The third section of the questionnaire asked students three general questions about the NMP case study. Again the responses to each question are presented in a separate sub-section below.

#### *Q7) What did you find MOST useful about the NMP case?*

A total of 61 views were expressed about the most useful aspect of the NMP case. The most common subject was the benefit of watching and listening to the interviews, mentioned by 14 students with responses such as:

- ‘Nice to hear managers describing the situation in their own words’
- ‘Came alive by seeing the management at Nokia and hearing from the suppliers’
- ‘The characters of the people—it made it easier to relate to their problems.’

The second most common subject was similar but featured more general comments on the visual nature of the case. 9 students commented about this, with examples being:

- ‘Hearing and seeing—message has more impact and is less “dry” than on paper’
- ‘Multimedia allows you to get better feel for the business issues.’

8 responses concerned the novelty of the case, making this the third most common subject, eg

- ‘Refreshing novelty value after umpteen written cases’
- ‘Innovative style—colourful and interesting.’

After this there were two subjects each mentioned by 7 students—ease of navigation around the case and the reduced amount of reading.

#### *Q8) What did you find LEAST useful about the NMP case (and how could this be improved)?*

A total of 53 views were expressed about the least useful aspect of the NMP case. The most common subject was the difficulty of getting an overall picture of the case—an interesting contrast to the 7 responses regarding ease of navigation! As many as 17 students mentioned this problem, in varying ways:

- ‘Layout was not clear and linear—one could go all over the place’
- ‘The case package did not give an overview on how the case was constructed’
- ‘Navigation around the case relatively poor—need a site map.’

Next to this, two issues drew comments from 7 students: the length of the case, eg

- ‘Quite laborious going through all, and some difficult to follow’
- ‘It was very long and took up a lot of time just before the exam’

and the built-in Internet links, eg

- ‘...for students off-campus the links don’t work so well’
- ‘...needing an internet connection to get some of the info.’

#### *Q9) Any other comments about the NMP case?*

A total of 40 other views were expressed about the case and here the most common subject was approval of the case, expressed by 10 students with comments like:

- ‘It worked for me’
- ‘Great concept—more of it’
- ‘I liked it and I think it was a useful teaching tool.’

5 students expressed further views concerning the novelty of the case, eg

- ‘A nice alternative to ploughing through a 15 page case!’

‘A refreshing change. I hope that you continue to use innovative teaching tools.’

Whilst in contrast, 5 others expressed a preference for paper case studies, eg

‘I prefer paper-based cases’

‘... but does take more time (particularly if you are a speed reader).’

### **Conclusions from initial survey**

Initial use of the NMP multimedia case study within the OM core course was a success as far as students were concerned. Only one question received an overall response worse than ‘Average’ or ‘Same’—indicating that, in overall terms, this case compared favourably with the paper cases used. However, the feedback regarding the multimedia format clearly indicated several problems, as well as polarisation of opinions. Some students were very enthusiastic about it, whereas others were very disappointed and described a strong preference for paper case studies!

Regarding the *insight* given to students, the content of the case was rated as better than average for all three of the chosen issues and was close to an average rating of ‘Good’ for the importance of managing supplier relationships. This suggests that it was a useful case for teaching Supply Chain Management. Regarding the *multimedia format*, it was only the ability to ‘identify with’ the management issues involved that was rated easier than in a paper-based case. Even this did not achieve an average of ‘Slightly Easier’. The ability to study the content of the case was a controversial issue, with 28 students rating it as ‘Slightly Harder’, ‘Harder’, or ‘Much Harder’; 21 rated it as ‘Slightly Easier’, ‘Easier’, or ‘Much Easier’; and just 7 rated it as ‘Same’. Such controversy could have been owing to varying levels of familiarity with personal computers, which might in turn be linked to the age of the students. This was clearly worthy of further research.

The main difficulty described in studying the case was that of getting an overview of its content. Various comments related specifically to: the limited detail in the contents ‘page’, the lack of an index, and the inability to search the text. Thus an initial conclusion was that, although the video elements helped students to identify with important issues, the case format did not provide adequate support for the learning process. Consequently, development of supporting material seemed appropriate. However, this ‘difficulty’ in finding material was probably intentional. One benefit of the multimedia format has been quoted elsewhere as the simulation of real situations in which managers have to seek out the information they require (Erskine, Leenders and Maufette-Leenders, 1998). Therefore, in this form, use of the NMP case clearly needed to be planned carefully to ensure students had adequate time to review and discuss it.

Almost one quarter of the comments on the most useful feature of the case involved its novelty or the reduced amount of reading required. Whilst the positive impact of its novelty was to be expected, that of the reduction in reading (replaced by listening) was not anticipated and this could be important within programmes that make substantial use of case studies.

Surprisingly, only 2 students mentioned the inability to annotate the case—despite this issue having been identified with the use of another multimedia case study at Harvard Business School (Upton and Steinman, 1997). A possible solution to this is to provide a companion paper version containing the basic text and allowing students to review the additional multimedia material as they wish. However, this survey suggested that such a move was not a high priority with Cranfield students. Their preference would seem to be for any additional support to be aimed at aiding navigation of the case content.

From a tutor’s perspective, this first use of a multimedia case study on the OM core course was successful for two key reasons. Overall, students rated it as better than an average paper case. More importantly it was rated most highly for the insight it gave into the importance of managing supplier relationships. This indicated that the case was well suited to the purpose for which it was chosen. The feedback also suggested that multimedia case studies have significant potential for

enhancing learning, but that careful attention should be given to their structure and the way in which they are deployed within a particular course.

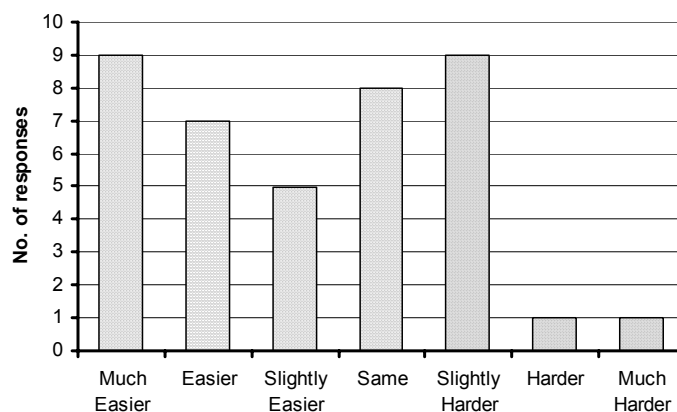
### Second survey and its results

The NMP case was deployed in a slightly different manner with the following cohort of students in 2001. A single page ‘contents listing’ was provided in addition to the CD-ROM. This was a direct response to the previous feedback and the fact that deployment of the case at Cranfield differed from that at IMD.

The survey questionnaire was extended with a fourth section that included two questions about the students themselves (see Appendix 2). One asked them to rate their previous experience of using computer-based multimedia materials on a 6-point scale from ‘None’ through ‘Very Little’ and a ‘Moderate Amount’ to ‘Very Extensive’. The second question asked them to indicate which range their age fell into from a choice of six (21–25 years through to 46–50 years). The response rate was 17% for this group of students, with 40 questionnaires returned from 232 students—somewhat lower than the previous group, but still good.

The results showed very similar patterns of responses to the first survey. However, ratings were generally more favourable. The questions about the *insight given* all received higher averages than in the first survey—3.8, 4.0, and 4.1, respectively. Thus this group rated the insight as ‘Good’. The questions about the *multimedia format* all received lower averages than in the first survey—2.6, 2.9, and 3.2, respectively, showing that overall it was considered to make these three things ‘Slightly Easier’ than with a typical paper case. Once again it was question 6 regarding the impact on studying the content of the case that polarised opinion. 2 students rated it as ‘Harder’ or ‘Much Harder’; whereas 17 rated it as ‘Same’ or ‘Slightly Harder’ and 16 rated it as ‘Easier’ or ‘Much Easier’ with just 5 rating it in between as ‘Slightly Easier’.

The results from Section C were also similar to the first survey. ‘Realism’, ‘interviews’, and its ‘interactive’ nature were the *most* popular aspects of the case; difficult ‘navigation’ and lack of an overall ‘map’ were the *least* popular aspects; and approval of the case was the most common theme of responses to question 9. Thus most results from the second survey confirmed those from the first, but with a shift towards positive views.



**Figure 8:** Second survey responses to question 6.

The additional data indicated that the average student age fell in the range 31 to 35 years and that their average previous experience of using computer-based multimedia materials was a ‘moderate amount’. When combined with the responses to question 6 in scatter plots, these data offered no explanation of the polarisation of opinions. There was a slight indication that younger students were more positive about the case, as none of the 9 who fell into the age range 26 to 30 years rated it as ‘Slightly Harder’, ‘Harder’, or ‘Much Harder’ to study than a typical paper case.

There was a similar, slight indication that those with very little experience of multimedia were more positive about the case. However, there was no indication of either factor having a strong influence. The explanation lay elsewhere.

## **Relevance and further research**

### *Relevance of this work*

This left an important question unanswered: why did the multimedia format of the case polarise opinion on the ease with which it could be studied? Or: why did 7 students from the year 2000 cohort think navigation was one of the *most useful* aspects of the case, whereas 10 of their colleagues thought it was the *least useful*? This is crucial to understanding when and how to use multimedia case studies, as well as how to construct them. When the overall results of the first two surveys show that use of the NMP multimedia case has had a positive impact within the OM core course, we need to answer this question in order to build confidently upon its success.

One clue may lie in the extent of the materials included in the NMP case, especially with the links to company Web sites (eg those for Nokia, Motorola, and Ericsson). The extent and the variety these materials (text, graphics, photographs, audio, video, Web links) meant that the case is a set of resources for learning. It is a more *varied* set than in paper case studies, which can only include text, graphics, and photographs and is also a more *extensive* set. Watching all of the video clips and reading all of the sections of text on the CD can easily take 1.5 h, without making extensive notes, watching video clips a second time, or looking at the associated Web sites! Thus this case study takes students into the realm of resource-based learning, which encourages them to develop deeper approaches to learning through the need to ‘interrogate’ the various resources (Brown and Smith, 1996). In turn this suggests that *learning styles* are relevant to the crucial question.

### *Possible impact of learning styles*

Given a range of resources, students will tend to make choices that suit their preferred style of learning. Some link these styles to the stages in the learning cycle. For example, Kolb identified four styles in line with the cycle presented earlier. Similarly, Honey and Mumford (1992) defined the styles of ‘activators’, ‘reflectors’, ‘theorists’, and ‘pragmatists’ to reflect their variant of the learning cycle. They suggest that identifying these preferences through a questionnaire like the Learning Styles Inventory (Kolb et al, 1974) and then designing learning materials around them, results in better learning. However, Patching (1999) suggests that use of the Myers–Briggs Type Indicator (MBTI) provides a deeper and more pertinent picture than these questionnaires. Indeed, according to Myers (2000: 37):

‘Psychological type identifies some of the normal differences in learning styles, providing a rational structure for designing activities for children and adults that encourage their learning—whatever style they prefer. ... Adults learn most effectively, especially when approaching new or difficult topics, when they are given opportunities to use their most effective learning style.’

There are different learning styles associated with the MBTI functions: Sensing, iNtuition, Thinking, and Feeling (S, N, T, F). These learning styles and their associated needs are shown in Table 1. These indicate that students with SF or NF preferences may like video interviews more than printed quotations, as a result of their preference for the feeling function and working with others. It is also possible that the different views regarding navigation were prompted by the different needs of those with a preference for sensing and those with a preference for intuition—the former may have been happier with the lack of a ‘map’ for the contents of the case study.

It is also plausible that the differences between the extravert–introvert and judging–perceiving types would influence students’ views on the NMP case. Extraverted types may enjoy the conversational style of the interviews, whereas introverted types may not like being forced to operate at the speed of the recording. Judging types might not like the lack of clarity in the

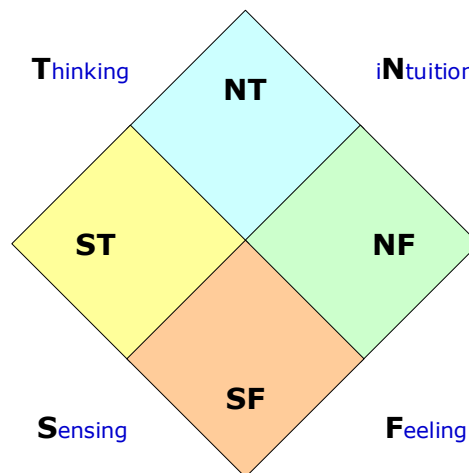
structure, whereas perceiving types might be quite happy to explore the different elements of information.

**Table 1:** Learning styles associated with the MBTI functions (Myers, 2000).

Preference	ST	SF	NF	NT
Learn best by:	Doing, hands-on activities	Doing, hands-on activities with others	Imagining, creating with others, writing	Categorising, analysing, applying logic
Need:	Precise, step-by-step instructions; logical, practical reasons for doing something	Precise, step-by-step instructions; frequent, friendly interaction and approval	General direction, with freedom to do it their own creative way; frequent positive feedback	To be given a big problem to solve, an intellectual challenge, and then be allowed to work it out

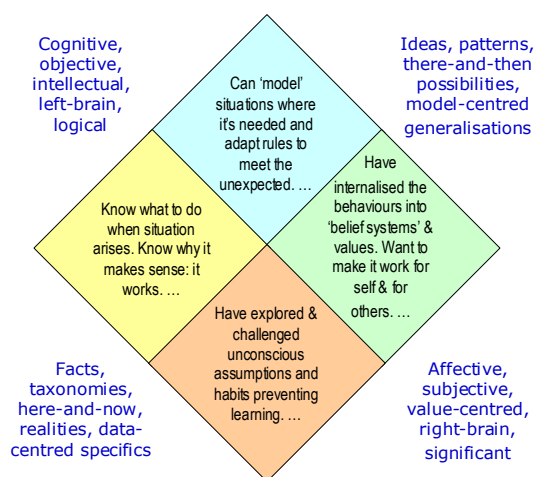
*Approach to further research*

This potential impact of learning styles upon students’ views suggests that MBTI results should be added to the questionnaire for the third survey on usage of this case study. All MBA students at Cranfield complete the MBTI questionnaire in the Organisational Behaviour core course and should, therefore, have the information readily available. Should psychological type explain some of the differences in feedback, this will be extremely useful in deciding how to deploy multimedia case studies and design/select new ones.



**Figure 9:** Patching’s Learning Diamond.

The full impact of this research may lie within its relationship to the Learning Diamond proposed by Patching (1999: 295) and based upon psychological types. Patching suggested that lasting learning brings about changes in behaviour and is dependent upon engagement of all parts of the learner’s personality. This leads to the idea that a course should include activities that engage all four sets of function pairs, rather than just one preferred pair. To achieve this, the variety of associated learning activities will extend beyond traditional case discussions. Thus the objective of continuing this research is to explore how a set of learning resources in a multimedia case study can support progress through some or all of the key components of lasting learning (Patching, 1999: 303).



**Figure 10:** Key components of lasting learning.

Where opportunities arise, this research will also be extended to the use of other multimedia case studies at Cranfield. This will be essential to generalisation of the results, as some of the differences in opinion may have simply resulted from shortcomings in the NMP case. These may have had a greater or lesser influence on particular individuals because of circumstances rather than learning styles.

### Conclusions

Initial use of the NMP multimedia case within the OM core course was successful from the perspectives both of the students and of the tutors. The three main features that the students liked were: the video clips of interviews with Nokia managers, the visual nature of the case, and the novelty of the format compared with many paper case studies. Their main dislike was the difficulty of navigating the different elements of the case without a clear map. Though only drawn from the use of one case study, these findings suggest that case enhancement with multimedia should focus on the provision of video clips featuring interviews with key characters and the graphical/pictorial presentation of appropriate information—whilst ensuring ease of navigation.

Student feedback included substantial polarisation of opinion regarding the helpfulness of the multimedia format. Neither the age of the students nor their degree of familiarity with computer-based multimedia materials explained this polarisation. Therefore, further research is required to establish its cause and inform future decisions both on course design and on case design. Because of its influence on preferred learning style, psychological type has been selected as a potential cause of the conflicting opinions. Investigation of its relevance will be facilitated by the fact that students assess their type in another core course at Cranfield. Thus it only requires the addition of a single question to the questionnaire used in the second survey.

### References

- Barker, J., Klassen, R. and Beamish P. (1997), *International Decorative Glass*, Case ref. 9-97-D010, Richard Ivey School of Business, London, Ontario.
- Bickerstaffe, G. (1998), 'Case Studies—Bringing Studies to Life', *Financial Times Survey Section—Business Education 97–98*, 19 April, p. 5.
- Brown, S. and Smith, B. (1996), 'Introducing Resources for Learning', in Brown, S. and Smith, B. (Eds), *Resource-Based Learning*, Kogan Page, London, pp. 1–9.
- ECCHO (2000), 'Darden School Adds Action, Colour, Sound and Speech to its Cases', *ECCHO Newsletter*, Issue No. 23, European Case Clearing House, Cranfield, p. 17.

- Erskine, J.A., Leenders M.R. and Maufette-Leenders, L.A. (1998), *Teaching with Cases*, Richard Ivey School of Business, London, Ontario.
- Hallowell, R.H. and Heskett, J.L. (1993), *Southwest Airlines: 1993 (A)*, Case ref. 9-694-023, Harvard Business School, Boston, MA.
- Heath, J. (1997), *Teaching and Writing Case Studies*, European Case Clearing House, Cranfield.
- Heikkila, J., Vollman, T.E. and Cordon, C. (1998a), *Nokia Mobile Phones: Supply Line Management*, Case ref. 699-005-1, European Case Clearing House, Cranfield.
- Heikkila, J., Vollman, T.E. and Cordon, C. (1998b), *Nokia Mobile Phones: Supply Line Management*, Teaching Note ref. 699-005-8, European Case Clearing House, Cranfield.
- Hoare, S. (1998), 'Hi-tech Tools Give Top Schools the Cutting Edge', *The Times*, 26 January.
- Honey, P. and Mumford, A. (1992), *Manual of Learning Styles* (2<sup>nd</sup> edition), Peter Honey, Maidenhead.
- Information Today* (1998), 'Stanford University Creativity in Business CD Receives Honours', *Information Today*, Vol. 15, No. 4, p. 41.
- Kolb, D.A. (1984), *Experiential Learning: Experience as the Source of Learning and Development*, Prentice Hall, London.
- Kolb, D.A., Rubin, I.M. and MacIntyre, J.M. (1974), *Organisational Psychology: An Experiential Approach*, Prentice Hall, New Jersey.
- Lane, R. and Sweeney, M. (2000), *Supply Chain Management in the NHS*, Case ref. 600-014-1, European Case Clearing House, Cranfield.
- Maufette-Leenders, L.A., Erskine, J.A. and Leenders, M.R. (1997), *Learning with Cases*, Richard Ivey School of Business, London, Ontario.
- Mullich, J. (1997), 'Teaching Harvard New Tricks', *PC Week*, Vol. 14, No. 4, p. 11.
- Myers, I. (2000), *Introduction to Type* (6<sup>th</sup> edition), Oxford Psychologists Press, Oxford.
- Patching, K. (1999), *Management and Organisation Development: Beyond Arrows, Boxes and Circles*, Macmillan Press, Basingstoke.
- Pederson, M.W. and Evans, P. (1997), *Codan 2000*, Case ref. 498-001-1, European Case Clearing House, Cranfield.
- Ramsden, P. (1992), *Learning to Teach in Higher Education*, Routledge, London.
- Upton, D. and Steinman, C. (1997), *Pacific Dunlop China (A): Beijing*, Teaching Note ref. 5-697-081, Harvard Business School, Boston, MA.

## Appendix 1

### Original Nokia Mobile Phones multimedia case study questionnaire

To help us plan for future courses, we would like to know your views on the Nokia Mobile Phones (NMP) multimedia case study. Please indicate your evaluation of the case content and format by ticking the relevant boxes in Sections A & B and providing general comments in Section C. Then answer the 2 questions about yourself overleaf and return the form to Andy or Bob; or to Wendy Morsley in the Grad' Programmes office.

#### Section A—Case Content

Please rate the case content in terms of the INSIGHT IT GIVES into the following:

	Very Poor	Poor	Average	Good	Very Good
1 the complexity of managing a global supply chain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2 examples of Supply Chain Management practice e.g. joint problem solving, information exchange	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3 the importance of managing supplier relationships	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

#### Section B—Case Format

Compared to a typical paper case, did the MULTIMEDIA FORMAT make it easier or harder to:

	Much easier	Easier	Slightly easier	Same	Slightly harder	Harder	Much harder
4 'identify with' the management issues involved	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5 understand the complexity of NMP's supply chain management task	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6 study the content of the case	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

#### Section C—General

7 What did you find MOST useful about the NMP case?

8 What did you find LEAST useful about the NMP case (and how could this be improved)?

9 Any other comments about the NMP case? (Continue overleaf if necessary.)



## Appendix 2

### Additional section of questionnaire in second survey

#### Section D—About you

	None	Very Little	Little	Moderate amount	Extensive	Very extensive
10 How much previous experience have you had of using computer-based multimedia materials? (e.g. tutorial software, simulation software, video on the Internet)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	21-25	26-30	31-35	36-40	41-45	46-50
11 Which age range do you fall within?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>