Leveraging Emerging Technologies in Management Education: Research and Experiences

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Education is one of the most relevant domains in which the integration of emerging technologies such as multimedia, groupware, and the Internet, is enabling significant innovations. A prerequisite for this development are appropriate frameworks to guide education professionals in exploiting advanced information and communication technologies to significantly enhance the quality and efficiency of traditional management learning and training methods. This article describes how such a conceptual framework, the *Business Navigator* method, can be adopted as a basis for integrating advanced multimedia telecommunication, object-oriented simulation, intelligent agents and virtual reality technology to design 'flight simulator'-like learning experiences with high pedagogical value. Technological and pedagogical implications of designing such state-of-the-art management learning approaches are illustrated and discussed. © 1997 Elsevier Science Ltd

Introduction: Evolving Needs and Opportunities

While many domains in business, industry and society have undergone major changes as a consequence of the developments and integration of computer and telecommunication technologies, the field of education, and in particular of management education, is still mainly based on pedagogical models and processes which hardly take advantage of the latest generation of technology and global telecom infrastructure.

Although multimedia, CD-ROMs, Internet and videoconferencing have begun to be adopted more extensively by educational institutions and corporate trainers, their impact is still very limited as these technologies are generally applied in the educational context without an in-depth revision and redesign of the underlying pedagogical processes and models for knowledge acquisition, creation, and dissemination.

As described in Angehrn, Doz and Atherton, the traditional management education methods in use today were developed in response to the stable and predictable business environment of the 1960s, 1970s and early 1980s. Organisations were characterised by hierarchical structures, internal focus, remuneration based on personal accomplishments, lifelong career expectations and individual competition fostered at all levels. Executive power was based on formal authority, person information access and network, political savvy and ability to get things done through others. As a logical consequence, management development programmes concentrated on developing functional and analysis skills for the graduate manager through MBA-type programmes and strategic and conceptual skills for the executive through short duration courses.

In the meantime, the business environment has undergone important changes. In order to respond to these environmental drivers, organisations have already started to rebuild and refocus themselves after a period of rightsizing tactics, to undertake continuous improvement and total quality management programmes and to empower employees and stakeholders to experiment with more flexible internal structures and to explore strategic alliancing and other cooperation strategies.
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Table 1: The Various Dimensions of an Open Networked Organisation are Compared with its Predecessor, a Closed Hierarchical Organisation

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Closed Hierarchy</th>
<th>Open Networked Organisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structure</td>
<td>Hierarchical</td>
<td>Networked</td>
</tr>
<tr>
<td>Scope</td>
<td>Internal/closed</td>
<td>External/open</td>
</tr>
<tr>
<td>Resource focus</td>
<td>Capital</td>
<td>Human, information</td>
</tr>
<tr>
<td>State</td>
<td>Static, stable</td>
<td>Dynamic, changing</td>
</tr>
<tr>
<td>Personnel/focus</td>
<td>Managers</td>
<td>Professionals</td>
</tr>
<tr>
<td>Key drivers</td>
<td>Reward and punishment</td>
<td>Commitment</td>
</tr>
<tr>
<td>Direction</td>
<td>Management Commands</td>
<td>Self-management</td>
</tr>
<tr>
<td>Basis of action</td>
<td>Control</td>
<td>Empowerment to act</td>
</tr>
<tr>
<td>Individual motivation</td>
<td>Satisfy superiors</td>
<td>Achieve team goals</td>
</tr>
<tr>
<td>Learning</td>
<td>Specific skills</td>
<td>Broader competencies</td>
</tr>
<tr>
<td>Basis for compensation</td>
<td>Position in hierarchy</td>
<td>Accomplishment, competence level</td>
</tr>
<tr>
<td>Relationships</td>
<td>Competitive (my turf)</td>
<td>Cooperative (our challenge)</td>
</tr>
<tr>
<td>Employee attitude</td>
<td>Detachment (It’s my job)</td>
<td>Identification (It’s my company)</td>
</tr>
<tr>
<td>Dominant requirements</td>
<td>Sound management</td>
<td>Leadership</td>
</tr>
</tbody>
</table>

These responses are resulting in changes to organisational form, policy and process. Tapscott and Caston\(^{54}\) capture the essence of these changes in their comparison between closed hierarchy and open networked organisations illustrated in Table 1.

The new skills necessary to manage during the turbulent nineties are evolving, requiring an increased breadth and depth of the managers’ skill-base in order to enable them to:

1. operate internationally and have a good understanding of cultural differences;
2. select essential data, interpret signals, determine clear objectives and act rapidly, often on the basis of excessive though incomplete information;
3. be flexible and adopt continuous learning as a philosophy of life;
4. get things done with others rather than through others.

Points 2 and 3 in particular have enormous implications on the way managers are trained. Concerning point 2, the new challenge of leveraging the information and intellectual capital of an organisation is considered critical by many advocates.\(^{17},^{32},^{33},^{41},^{50}\) Key drivers shaping the focus on information and knowledge as corporate assets are the exponential increase in capacity to store information, with storage capabilities doubling every 18 months\(^{51}\) and the exponential decrease in the cost of computing, halving every three years.\(^{55}\) The combination of being overwhelmed by the amount of information available and unable to grasp and exploit the advances being made in computing and communication technologies is a problem for the majority of executives and companies today. Taking the perspective that information and knowledge are resources to be utilised on a cost effective basis, in order to achieve corporate goals, executives need to develop skills and processes which enable them to select, analyse, interpret and communicate information faster than their competitors in what is becoming a single worldwide information network.

Related to point 3, the new business scenario requires organisations and individuals to adopt a continuous learning philosophy.\(^{8},^{12},^{15},^{16},^{17},^{49},^{59},^{61}\) This will require a completely new supporting and stimulating educational infrastructure. At a personal level this implies a need to 'know thyself better', to continually challenge and adjust mental models\(^{59}\) through action and critical reflection processes.\(^{5}\) From a corporate perspective, it is necessary to institutionalise these practices, adopt a system-thinking approach to understanding complexity, focus on team rather than individual performance and create a safe, open environment in which team members can learn with and from each other. From a training perspective, the key to putting this philosophy into practice is to understand the relationships between course content and delivery methods and the impact they have on how we learn so that the most effective approach is used for each learning experience.\(^{1}\)

The Business Navigator method illustrated and discussed in the following sections provides a conceptual framework for redesigning management development approaches, reflecting both the new needs listed above, and the paradigm shift that computing and telecommunication technologies have undergone since the early eighties, when the personal computer appeared and immediately became a tool to design, deliver and distribute pedagogical material. The benefits realised by learners and companies to date include improved computer literacy, control of learning pace, refresher/practice courses available on demand and increased understanding of economic, marketing and production theories through the use of pre-programmed simulations.\(^{43},^{44},^{56}\)

In spite of these benefits, the use of computers has been quite limited in the education and teaching fields.\(^{21},^{25}\) Computers have been used mainly to display text and simple graphics, speed up mathematical calculations, and run text- and number-based business simulation games. From a technical viewpoint, the low utilisation rate can be attributed to three main limitations of the current

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Minitel - A Home Retailing Application

Introduction

"We realised right at the outset that Minitel was a very valuable means of communicating with our customers."

Pascale Remita
Head of Videotex at CAMIF

Pascale Remita was analysing the results of Viniphile (Exhibit 1 Transcript, Exhibit 1 Transcript for the English, Exhibit 1 Video). Minitel-based wine service introduced by (Coopérative des Adhérents de la Mutuelle Instituteurs de France) in October 1989. In October 1989, wine sales went up in 1990 compared with

Figure 1 Example of an Interactive Multimedia Case Study

generation of technologies: (1) poor quality of human-computer interaction, (2) limited integration of different media (documents, pictures, video), and (3) limited networking capabilities. This is now changing. For instance, multimedia and virtual reality technology can be successfully exploited to overcome the quality and integration limitations of computer-based training tools. In the specific field of management education, efficient approaches to apply multimedia technology to the development and delivery of case studies have been experimented and tested in the early nineties. Such experiences have led to the rapid and relatively inexpensive development of interactive multimedia case studies such as the one displayed in Figure 1, consisting of a combination of narratives, multimedia components and interactive exhibits (e.g., manipulation of financial data through spreadsheet-like interfaces), knowledge bases describing concepts related to the case study, and more recently, on-line discussion spaces allowing case authors, instructors and students to access and discuss a case overcoming space barriers.

In fact, the seamless integration of text, voice, music, graphics, animation, still and moving pictures, is enabling the design of experiential learning experiences which retain the learner's interest and deliver accurate, recent information. But the benefits from multimedia and virtual reality cannot be fully realised without the advances being made in networking and communication technologies. The combination of network, data and video communications with the emerging computer supported cooperative work (CSCW) applications make it possible today to design new learning methods and delivery. For many global businesses, this means they can leverage their extensive investment in communication and information infrastructures and groupware and link to universities, staff households, other parts of the company and external experts in order to achieve both their business and learning objectives.

For the learners, the combination of modern information and communication technologies can provide interactive access from home to a global multi-disciplinary team of professors and practitioners or corporate advisors. For academic institutions, the walls have been removed from the classroom, the buildings have been removed from campus, and the learners, teachers and experts can intervene interactively from anywhere in the world.

In summary, the stable, predictable and hierarchical business world is rapidly changing. The new model involves unpredictability, uncertainty, information overload, flexible corporate and decision-making structures and cooperation. The essential components for developing the next generation of executive development pedagogical tools are also available. In education as in architecture, form follows function, therefore the challenge is to leverage the insights in learning theory, the advances in information and communication technologies and to experiment with the design of innovative management development solutions.

The Business Navigator Method

The Business Navigator Method is an approach to management development which combines the advantages of the two most widely used methods (Case Method and Business Simulation Games) and defines a framework for the integration of computer and telecommunication technologies underlying the next generation of management development tools. The key
to Business Navigator is the development of a virtual interactive business environment (VIBE), a realistically simulated business context (e.g. a company) which the learner is invited to explore step-by-step in the course of a 'virtual visit'. With a VIBE, case reading is transformed into a real experience in which one can wander through buildings, enter offices, look for information, meet people and interact with them. In a VIBE, a given business context is mapped onto the three interconnected navigation levels illustrated in Figure 2: the physical network, the organisational network and the information network.

The concept of navigation on the first, physical level is straightforward. The navigator moves in the physical business environment, walking through corridors and public spaces, entering offices and meeting rooms. Current multimedia and interactive video technology allows the production of such 'navigation scenes' in which one can decide dynamically in which direction to 'turn one's head' in a given location (e.g. an office), control movements from one location to another (e.g. walking down a corridor to reach a specific office) and use equipment such as telephones and computers. Virtual reality technology can further enhance the realism of the experience by immersing the learner in the business environment through sight, sound and touch.

At the second level, the concept of navigation is extended to a network of 'information owners'. These agents can be contacted on request and can give access to the information sources made available in the third navigation level. This second level represents the formal organisation structures, inter- and intra-organisational relationships, and personal networks of individual organisational actors.

At the third level, the information sources associated with the 'information owners' are accessed, such as video and audio interviews, documents, organisation reports and extended databases. These information sources are only accessible on request, after contact has been established with specific organisational actors (e.g. the company's CEO) or external information providers (e.g. market researchers or industry experts).

Pedagogical Implications of the Business Navigator Method

By adopting a 'flight simulation' approach to management education, the extended set of pedagogical objectives that can be achieved through the Business Navigator method include dimensions that are difficult, if not impossible, to reach through traditional educational methods, such as:

- learning how to manage complexity (e.g. information overload, complex social interactions)
- learning how to deal with constraints (time, skills, perspective)
- learning how to develop efficient information gathering and interpretation strategies ('sense making')
- understanding the role of information (and information ownership related to different organisational structures) in companies
- richer discussion material given the difference of individual strategies
- richer experience ('case writer perspective' rather than 'case reader perspective') involving both action and analysis.

In more detail, five pedagogical objectives underlie the Business Navigator Method.

First, the method aims at providing a systematic approach to modelling — and hence communicating — a dynamic, lively image of a global organisation. The approach goes beyond the passive use of videos, written reports and traditional exhibits, as it is based on the metaphor of an 'interactive visit' and 'discovery experience', in which decisions on what to see, whom to contact and which information to collect about the company are taken...
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PHASE 1
Navigation experience in a Virtual Interactive Business Environment (individuals or networked teams)

PHASE 2
Group discussion and comparison of experiences (co-located or distributed teams)

Figure 3 The Two Phases of the Business Navigator Method

dynamically. It creates a ‘learning by doing’ stimulus in a safe environment in which mistakes can be made.

Second, it emphasises the importance of being able to manage efficiently two crucial resources: time and information. This is achieved by simulating the complexity of today’s business environment in a realistic way. The learner is exposed to accurate volumes of business information related to industries, organisations and environmental forces — social, cultural, economic, technical, political — thus significantly increasing their knowledge of industry, organisational and interpersonal dynamics. The method provides an effective way for conveying important messages concerning the value of information (information is not for free; decision-makers need to set boundaries to their intelligence gathering processes, etc.), the need for developing and refining strategies to decide who to approach in an organisation, and when, where and how to approach them (information is not always easy to get as it is grounded in a social environment) and other peculiar characteristics of this resource (information is not necessarily consistent; information is subject to interpretation and to discounting).

Third, the method provides managers with the opportunity to reflect on the speed and quality of their decisions in complex and information-intensive situations. For this specific purpose, so-called ‘stimulus agents’ interactive in the roles of advisors, devils advocates and story tellers provide continuous stimulus for the learners to reflect on the speed and quality of their decision-making, as well as on their navigation experiences, information gathering and time management strategies.

Fourth, the method focuses on training the learner in problem/opportunity identification, interpretation and sense-making skills in addition to improving analytical and problem-solving skills. The learner is required to act and demonstrate initiative, make sense of the information collected and actively practice all forms of interpersonal and communication skills along his or her interactive journey through the organisation. While the traditional case method can be used effectively to train managers to analyse a business context summarised and pre-structured in a 20 to 30 page narrative, the Business Navigator Method shifts the perspective of a manager from the ‘case reader’ to the ‘case writer’ seat. Adopting this point of view corresponds more to the reality managers are confronted with in practice. Information is not provided in advance in a well-structured report. It must be collected, extracted from its social context, selected, interpreted and structured into a coherent picture. As is the case in practice, analysis and action, interpretation and information gathering, problem-solving and problem recognition are not separated, but interlinked managerial activities.

Fifth, the Business Navigator Method, by providing learners with the opportunity to experience the complexity and interactions of a business environment, also significantly enhances the quality and diversity of the ensuing discussions and reflection (see Figure 3). Experiences with the EIS Simulation, the first learning tool based on the Business Navigator Method, in a large number of MBA and Executive programmes, show that rich ‘navigation experiences’ provide the foundation for lively group discussions on the solutions the learners have generated, both individually and in teams, for given contexts and situations. Facilitated reflection on personal experiences in relation to strategies and processes used during the navigation enables the learners to compare experiences and examine how their culture, functional discipline, work experience, individual and team behaviour as well as other factors influence their information gathering and decision-making processes and help them appreciate the diversity of managing and working in multi-cultural and global teams. This is in addition to the traditional benefit of increasing the learners’ understanding of various theoretical frameworks.

In summary, at the pedagogical level, the main strengths of learning tools based on the Business Navigator Method include:
creating a powerful, safe experiential (learning by doing) experience
• capturing and mirroring the complexity of today’s business environment
• expanding personal organisational and industry knowledge
• emphasising the importance of managing time and information
• interactively stimulating continuous reflection on quality and speed of decision-making processes
• complementing opportunity and problem-finding with interpretation, sense-making, problem-solving and communication skill development
• developing team-building sensitivities and skills
• stimulating reflection on person experiences and being able to appreciate the variety and diversity of management thinking and action.

Technological Implications of the Business Navigator Method

Different technologies are available today for modelling and implementing the three levels of a VIBE (see Figure 4).

Typically, modelling the first level, i.e. the physical business environment, can be performed through computer-based representations of ‘virtual spaces’ such as offices, corridors, or meeting rooms, through which organisational agents — including the user(s)/learner(s) — can navigate. Technologies available to implement ‘virtual spaces’ and navigation mechanisms range from systems providing flat (2-dimensional) and relatively static visual representations with limited navigation option, to very sophisticated systems providing a high sense of realism. Hence, simple VIBEs can be implemented using traditional hypermedia authoring tools such as Hypercard, Toolbook, Director, or HTML-based packages. Here, physical networks are represented by series of static images (e.g. pictures of offices or libraries) and navigation takes place through simple actions such as ‘go to’ commands associated with parts of static images (doors, switches, etc.). In order to add realism to such simple representations, multimedia elements can be easily associated with navigation actions or events. For instance, the background sound of a cafeteria may be associated with a specific virtual space in order to recreate a given atmosphere, or a video of a trading floor may enhance a bank scene. More realism can then be achieved by exploiting virtual reality (VR) technology to model and visualize real-time 3D systems. VR modeling has been made accessible through environments such as QuickTime VR, and even more sophisticated, truly object-oriented modelling and rendering environments are no longer the reserved domain of specialists equipped with powerful workstations or dedicated computer hardware. Technologies for designing virtual worlds are still relatively new, often rely on proprietary technologies (such as Superscape or Worldtoolkit) and are still more expensive than traditional hypermedia authoring tools. However, the advent of standards such as VRML (Virtual Reality Modeling Language), and the availability of software taking advantage of such standards (browsers such as Live3d from Netscape or authoring tools such as Pioneer from Caligari Inc.) are further facilitating the design of VR environments, both stand-alone and networked (such as in the Internet game Doom and in the virtual worlds WorldChat and Alpha World, both based on proprietary technologies).

The organisational network level is the place in the VIBE where most of the deep knowledge to be taught to the user is represented. At this level, the user has to be able to experience different forms of interaction. These include (1) simple observation, e.g. of social spaces such as the company’s cafeteria, (2) consultation of available information resources, e.g. by accessing a database in a documentation centre or reading the company’s newsletter, (3) access to company resources such as a ‘virtual’ internal mail, and (4) interaction with organisational agents, where such agents would be either computer-controlled with predefined behaviour or controlled by other users represented by ‘avatars’ in the case of knowledge discovery and knowledge assimilation, the quality of the interactions taking place at the organisational network level, and of the feedback the user gets from the actions he or she initiates have a direct impact on the quality of the learning experience. Hence, technologies suited to the implementation of the
organisational network level of a VIBE must provide both advanced knowledge representation frameworks and high-level interactivity. Object-oriented technology, including agent technology, non-monotonic logic, knowledge classification models, and object-centred, cognitive CHI (Computer-Human Interfaces) methods are the most suitable candidates to design sophisticated VIBEs. To represent knowledge at the organisational network level, the design process has to rely on the definition of a set of taxonomies covering all the categories of elements included in a VIBE. Such taxonomies then provide the basis for encapsulating knowledge in different elements of the VIBE's organisational network, mapping them for instance in a set of classes using an object-oriented language such as Smalltalk or C++.

A direct advantage of this approach is that once the main taxonomies have been defined, they can be re-used efficiently to design different VIBEs by using through example objects in the function of new or specific learning objectives. For instance, the design of a VIBE stimulating learning in a small manufacturing company can be performed by using through example a relatively small number of managers, a large number of workers, and some simple communication means, such as an internal newsletter and meetings. On the other hand, a VIBE whose pedagogical objective is to expose managers to the dynamics of information flows in a multinational organisation, would be designed by using through example a complex organisation consisting of a large number of managers (further classified in marketing, finance, accounting, and sales managers) and office workers, and a great diversity of communication resources (such as e-mail, videoconferencing, internal newspapers, committees, etc.).

High-level interactivity further enhances the realism of the learning experience by enabling users to generate and interact with different visualisations of the organisational network. Agent technology and paradigms (active objects, autonomous agents, etc.) can be used in this context to model the visual representation, animation, and dynamic behaviour of organisational agents which represent the human beings populating a VIBE.

For instance, in the EIS Simulation learners are challenged to intervene in a division of a large company during a simulated period of 6 months. Their mission is to gradually convince the 24 managers of the division to adopt a major innovation. The department managers populating this VIBE have different roles and display different patterns of resistance to change, which the learner can influence by applying an extensive set of organisational development tactics ranging from information gathering techniques to individual meetings, the organisation of pilot projects or executive development programmes (see Figure 6). Genetic algorithms, neural network, and case-based reasoning mechanisms encapsulated in stimulus agents can be used here to introduce a certain degree of evolution and adaptability in the behaviour of such active entities, allowing VIBEs to be modelled as dynamic, living systems.

From Stand-alone to Distributed, Multi-users VIBEs

In theory, VIBEs can be designed as stand-alone systems deliverable to individual learners through CD-ROMs or similar digital storage devices. In such case however, the VIBE would need to include all the pedagogical material necessary to cover all the aspects of the knowledge to be transmitted and would not allow interaction with experts or with other learners. The development of distributed, multi-user VIBEs requires an additional level of technical and design complexity, but can considerably enhance the nature of the learning experience. The distributed dimension transforms VIBEs into open systems, allowing users to learn how to efficiently access external information and knowledge resources available for instance on networks such as the
A strong believer in the potential of the Human Resources function, but frustrated by its passive "reputation". Trying to professionalise the work, and be more responsive to the business strategy. Seen as a "people person" who enjoys his relationships. Active in local charity organisations.

Managers who have not been trained yet:
- Rob Boss
- Silvia Linn
- Tina Fein
- Urs Dodd
- Frank Scotti

Your rationale for this decision:
Rob, Silvia, Tina, Urs, and Frank are close collaborators of George Glenn, the HR Director. It might be good to send them to a course to get them excited about the change, in spite of the clear resistance coming from the CEO, Ann Finkelbaum.

Figure 6  Gathering Information and Selecting Organizational Tactics in the EIS Simulation

Figure 7  Scenes from Alpha World ('CALT Virtual Business Centre', located at coordinates 0 N, 2100 W)

Internet. The multi-user dimension can be used to transform a VIBE into a 'virtual classroom or laboratory' in which different learners and experts can exchange ideas, share their knowledge and discuss/compare their real or virtual experiences. Experimentation with such sophisticated distributed learning environments are currently conducted at the Centre for Advanced Learning Technologies (CALT) at INSEAD. For instance, sections of the INSEAD Web site (see www.insead.fr/Programmes/Executives/CIIA/) have been designed to enable international groups of managers to keep in touch after having attended a traditional executive
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development programme. Communication spaces based on groupware technologies facilitate the exchange of knowledge, the access and sharing of learning resources, and the discussion of relevant topics related to the training programme the managers have attended. In addition, virtual meetings and events can be organised in a 'Virtual Business Centre' located in a 3D environment in which managers 'walk around' using animated 3D representations (avatars35,67), engage in small group discussions, or attend virtual lectures 'sitting' in a virtual amphitheatre accessible directly through the World Wide Web (see Figure 7).

The technical implications of designing distributed VIBEs include the definition of gateways with external sources of information such as databases, data warehouses or Internet resources, and requires from designers a deeper understanding of telecommunication standards, distributed object technology, client-server architectures, and TCP/IP programming. However, designers can greatly benefit from advances in the domain of distributed computing and Internet-based technologies/standards such as HTML, VRML, and the Java language. Integrating multi-user capabilities in VIBEs is even more challenging as it requires a more advanced knowledge of CSCW (Computer Supported Cooperative Work) technologies, distributed interactive simulation (DISA),63 and multi-agent architecture. The maturity and spread of commercially available groupware platforms such as Lotus Notes, of distributed, multi-user virtual reality environments such as WorldChat and Alpha World (see Figure 7 adapted), and of standards for multi-agent technologies such as KQML/KIF are however making the development of sophisticated VIBEs increasingly affordable.66

Conclusions

The developments discussed in this article demonstrate how the integration of computer and telecommunication technologies can be leveraged to improve education through the design of a new generation of pedagogical tools. In particular we concentrated on the evolution of management education, as a representative for a broader evolution process which includes the convergence of communications technology with educational technology and modern incarnations of artificial intelligence, and with global networks enabling new forms of knowledge creation and exchange. Dramatic changes are underway in the creation and delivery of management development, which will transform:

- the relationship between providers and suppliers (business schools etc.)
- the management of training programmes in governments and private enterprises
- the development of corporate 'learning and knowledge management platforms'.

One of the key factors affecting the speed of this transformation process (besides the availability of appropriate technical infrastructures in schools and companies) is the rapid diffusion of the skills required to design, develop and deliver advanced management learning experiences such as those based on the Business Navigator Method. While traditional management development programs and learning tools are focused around the concept of face-to-face sessions (mainly lectures or discussions) requiring all the people involved — instructors and managers — to be present at the same time in the same place, new pedagogical skills are required to design and animate learning processes which take advantage of the 3 models illustrated in Figure 8 and combine them in the most appropriate and efficient way.

Setting up such highly integrated, technology-enhanced pedagogical processes and developing the skills necessary to animate them both in a face-to-face and in an on-line setting represent a major challenge for management educators. As in other industries such as advertising or publishing, a critical factor will be the willingness of all those involved in management education to change their current perceptions about technology (from threat to opportunity for new creative solutions and better access to information) and to start experimenting with new educational models.

**Figure 8 Designing Advanced Management Development Programs**

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Notes


35. It's a Bird, It's a Plane, It's ... an AVATAR! A Look at Worlds Inc.'s Alpha World, to be found @ http://www.online-magazine.com/awfile.htm.

36. Jacobs, N. and Shea, R. The role of Java in Infsleuth: agent-based exploitation of heterogeneous information resources, to be found @ http://www.mcc.com/projects/infosleuth.


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