# AROUSAL COMES OF AGE

**Professor Peter Lansley**
School of Construction Management and Engineering, The University of Reading, Reading, RG6 6AW

ABSTRACT: This year will see the celebration of 21 years of the AROUSAL Simulation System as a vehicle for the development of middle and senior managers in the construction and engineering industries as well as a valuable learning tool for undergraduate and postgraduate students. The system continues to be used throughout the world by leading construction and consulting organisations as well as by universities and training providers. Although for many its value lies in demonstrating a simple integrated management information and decision processing system its success as an approach to management development rests more on its underlying sympathy for how individuals and teams learn, solve problems and develop, rather than on its demonstration of AI and IT systems. The background to the development of the simulation system, a very clear understanding of learning and development processes, has lessons for the design of contemporary e-learning systems. For these there is a danger that an over-concern with the capabilities of technology will be at the expense of the needs, skills and preferences of the learner.

Keywords: learning; management development; simulation

## INTRODUCTION

The possibilities for the development of new approaches to learning which exploit the power of e-learning systems are many and varied, and some of these systems are likely to be exceptionally supportive of learning. However, in construction where the research and development environment is characterised by a belief in empiricism rather than theory, and pragmatism rather than reflection, there is a risk that key elements in the design of new learning approaches may ignore those important elements that can optimise learning. The attractions of the capability of new technology may become more important to designers of e-learning materials than a concern for the way in which individuals actually learn. Despite their promise, in the 1960s and 1970s several genres of business games employing mainframe computers, and in the late 1970s and 1980s interactive video systems, were of limited usefulness. This was largely because they were driven by a concern to exploit technology rather than having sympathy for the way individuals learn. The same could be true of e-learning systems. However, the development of sophisticated web-based learning systems is too recent to allow adequate evaluation of the effectiveness of the learning experience which they provide for both the learner and the educator. Certainly this is true of systems supporting the delivery of, say, complete degree courses rather than just those parts of courses which are most amenable to web-based learning. At this stage the enjoyment of both learner and educator in being involved in pioneering developments will support initial progress. Only when such delivery mechanisms have become a more familiar feature of courses will objective evaluation be possible.

The motivation for this paper is three-fold. The first, is that because the attractiveness of new approaches derives more from novel technological advances rather than an improved understanding of how individuals learn, issues relating to learning processes may be neglected in preference for exploiting technological developments. The second, is to address this first concern about the needs of the individual learner by reflecting on lessons from the development of a system which, although predating the present generation of e-learning systems, relied heavily on rapidly and dramatically improving information technology systems. It too could have suffered from being over-concerned with exploiting new technology. Sufficient time has passed to be able to take a long-term view of this development and to evaluate its effectiveness. The third motivation is to encourage those who may be investing significant energy into the development of e-learning systems to take time to understand the ways in which individuals learn and how these ways can be influenced by the manipulation of the learning context. The intention is to encourage developers to find ways of reconciling the gap between providing those contexts which are most conducive to learning and those which are achievable through adopting e-learning methodologies.

The paper considers these issues through reflecting on the development of the AROUSAL Simulation System (*A Real Organisational Unit Simulated As Life*), a novel approach to the development of managers in the construction industry. The system has been used extensively by management trainers and consultants for the development of junior through to senior executives in the construction, engineering and allied industries as well as by universities with undergraduate and postgraduate students. Although developed in 1980 and fully operational by 1982, hence the title of the paper, and so not a recent development, it continues to be used by executives and students in many countries. Each year there are many new users.

**AROUSAL**

The focus of AROUSAL is the development of strategic decision making skills. The vehicle for this is the management of a simulated construction business as a whole from the point of view of the senior managers or directors of the business. The firm's survival depends on gaining, undertaking and completing projects. Whilst decisions about the management of individual projects are important and can be critical to the survival and success of the firm, the AROUSAL experience is essentially concerned with the strategic and general management of a firm, the information which is required to run the business and the decisions which have to be made by senior managers. It also concerns the relationships between individual senior managers represented by individual team members who run the simulated business, typically in teams of four, and how these impact the flow and interpretation of information and the resulting decisions.

A description of AROUSAL and of the experience of AROUSAL users has been reported at length elsewhere (Lansley, 1982; Devine, 1986a; Devine 1986b). However, in brief, the system comprises two major learning experiences.

**Case-Study**

The first experience is introduced by an audio-visual case study supplemented by written documentation to provide an accessible and realistic scenario about a small company or business unit that is in need of better management. Whereas 21 years ago the presentation of the case study was through video-tape or audio-tape synchronised with 35mm slides, PowerPoint now provides an acceptable and highly accessible medium. The case study materials are tailored to introduce issues embedded in a context which participants will recognise and feel motivated to resolve. This is achieved by basing the case study on a real firm and ensuring that the presentation concentrates on the issues faced by key people in the case study. These people present the issues; they can be seen and heard introducing the details of the case from their perspective, in their language of the industry, not that of a commentator. Supplementary documentary information is also provided. Thus, the participant has available a wide range of information presented in a variety of formats and through different media as well as personal reactions to that information, to form the basis for discussion with other team members.

Typically the explicit task of the team is to develop a strategy and business plan for the firm and to present this at a plenary session for discussion with other teams and the course tutor. However, there are a number of implicit tasks that have to be undertaken if this explicit task is to be fulfilled. The information gleaned from the case study and the team members' different interpretations of that information have to be reconciled and developed. So there is a major information management task. In turn this requires that a team and its deliberations have to be managed if the interpretation of the situation faced by the firm is to lead to a strategy and plan for its future.

This first learning experience draws on a rich information environment and range of stimuli for learning about the firm and developing a strategy and plan for its development. It is a multi-dimensional experience, with different aspects appealing to the participant in different ways. Each aspect contributes in a distinct way. Whilst as a team exercise it is highly participatory and each team member has to contribute information, skills and expertise across a wide spectrum of issues there is the opportunity to work individually on specific aspects. So the case study provides a rich backcloth for developing an understanding of the management of the business and of information as well as personal relationships within a team. Also the course tutors emphasise and highlight key issues and pursue particular objectives relevant to the needs of the participants. The focus of the course can be on technical aspects of business management or behavioural aspects of managing a business and a team or a mixture of both depending on the nature of the participants and the objectives of the course.

This first experience concludes with presentations from each team, discussion involving all teams and tutor feedback. This is followed by the introduction of new information and materials relating to particular aspects of the management of the business, especially business planning, and possibly on the management of information, and on team work and leadership. In total these activities take about a full day to complete.

**Simulation**

This leads to the second experience, which is based on an invitation to the teams to manage the firm into the future using a sophisticated information and decision processing system - the AROUSAL simulator. Participants are provided with key information which would be available to senior management about the performance of the firm, its resources and market situation. Using this information they plan ahead and make decisions. They receive feedback about the performance of the firm and the consequences of their decisions. Information and decisions are made on a quarterly basis. Amongst other aspects they have to handle financial, marketing, procurement, production, organisational, and human relations information, understand the interrelationships between these and make decisions which ensure the progress of the firm. They have to develop strategies and put these into operation. As with the first experience, individuals operate within a very rich information environment, provided by the simulator, by their own experience, and by other team members, enriched by successive iterations of discussion, analysis and decision making. Here again the explicit task is running the business whilst the implicit tasks are those of information handling and teamwork. But the experience is longer, typically the equivalent of two full days, and richer because of feedback which is provided on the effectiveness of decisions and the sense of ownership of the simulated company which quickly develops. This is further enhanced where the tutor is able to input information, models, materials and perspectives following the case study presentations, which participants are able to use during the simulation exercise.

The second experience concludes in a manner similar to the first, with presentations by each team on how they have managed their firm, discussion, debate, tutor feedback and possibly further sessions to reinforce particular learning points or to develop individual learning agendas.

**BACKGROUND**

The development of AROUSAL was in response to a number of perennial issues faced by the construction industry. Even though the nature of the construction industry and business conditions have changed, as with today, in the early 1980s there was considerable dissatisfaction about the relevance of much of the material used for developing managers in the industry. This was a time when many managers were not able to keep abreast of the rapidly changing business, technological and organisational environments, and much training material was outdated, reflecting past rather than present environments. This was especially true of material for developing the strategic problem solving skills of senior managers. And it was not helped by the general lack of interest in the industry in developing its managers and a weak infrastructure for management training in the UK construction industry with only the CITB having the potential capacity to interact effectively with large numbers of managers.

These issues were not solely in the province of construction. The writings of leading management consultants and a concern about business schools having become "too soft and too academic" and "not close enough to the coal face" reinforced by a general dissatisfaction with the effectiveness of business

schools had challenged the business schools to do better. In particular there was dissatisfaction with the paucity of attention given to the development of strategic problem solving skills. At that time popular choices were between what were considered to be naive business games, inappropriate case studies, pontificating pundits and "outward bound" leadership exercises, none of which could be shown to be particularly useful, especially to the construction industry. Although the cost of management training was often cited as one of the reasons for the lack of support from the industry, in retrospect this seems to have been a convenient excuse. In reality the industry was not prepared to pay for training in which it had little faith. As the development of AROUSAL was to show, when convinced about the value and appropriateness of training, industry support could be positive and enduring.

A recognition of the industry's concerns prompted a review of whether more relevant, stimulating and appealing materials could be developed which at the same time could draw on recent contemporary research findings and other objective information about strategic management, organisation and company performance in the construction industry.  It was this investigation which eventually led to the development of AROUSAL. However, the path to the development of the system was not straightforward.

## Initial Steps

Focusing largely on middle-managers, initial work concerned understanding those factors which contribute to an effective learning experience and facilitate the transfer of new information and perspectives into practice, as well as the development of new skills, behaviours and attitudes. This required extensive observation of learning situations, discussions with participants attending management courses, as well as with experienced trainers and tutors and experts on learning, and reviews of the literature. The analysis of these materials consistently indicated the potential usefulness of a simulator and generated a clear specification of desirable design characteristics; features to be incorporated and others to be avoided. Based on an enhanced understanding of learning processes, the specification then led to an approach which was to exploit new and rapidly expanding technological possibilities, in this case offered by the PC which became widely available in the early 1980s, although initial work commenced on a mainframe computer. However the use of technology was tailored to an understanding of learning processes, rather than processes being expected to fit the capabilities of technology.

## Learning Styles

One of the most important influences on the specification was an analysis of learning styles. This showed the wide variation of preferences amongst managers, especially in construction, and the importance of the contribution to learning from interaction with peers in understanding information and in making decisions. In brief, the simple but powerful model proposed by Kolb (Kolb et al, 1974) and, in somewhat different form, adopted by Honey and Mumford (1982), became an important reference point. In essence the observations and the model continually reinforced the message that individuals learn in different ways and that the design of any learning experience has to recognise and support the range of preferred learning styles.

Many of those involved in management development courses were reluctant participants, few volunteered for such experiences, and often their interest in education and training activities was low. Many were apprehensive. This further strengthened the necessity for appreciating individual differences. In particular there was a need to recognise that effective learning would take place only if participants initially were able to operate within a familiar setting, that is able to view issues and problems from within their existing horizons and within in an everyday context. Then, through a process of learning they could discover new horizons and move to new contexts for viewing the issues. In essence this prescribed that the learning experience had to start with the world of the participant and work outwards rather than offer a new world and expect the participant to make perceptual, cognitive and motivational leaps into what could be an unfamiliar context. The implication for the simulation system was that of the need for flexibility so that the issues faced by the simulated company could be understood through a variety of different types of information rather than through the user needing to understand all of the information. Also, the level of sophistication of the information provided would, metaphorically speaking, range from that needed to fly a Spitfire to that required for Concorde.

The issue of flexibility, reflecting the varying needs of individual learners was to provide some of the severest challenges in the design of the simulation system and some of the greatest rewards. In due course the resulting system provided the facility to develop a family of simulators reflecting different business settings (for example, building, civil engineering, mechanical engineering), sizes of business and national contexts (for example, UK, USA)

**Detailed Specification**

In broad terms the focus of interest was understanding and developing systems to aid the strategic decision making skills of senior and middle managers within the context of managing the business rather than managing individual projects. The detailed specification was developed drawing on two sources of information. Firstly, there was observation and discussion with participants on courses concerned with the management of the business as a whole and with trainers. This revealed a range of issues each of which either facilitated or hindered learning. In particular these pointed towards a number of strengths and weaknesses of business games and case studies and suggested that these strengths and weaknesses are complementary (Lansley, 1982).

Secondly, discussion with other senior and middle managers about the issues they faced in managing their businesses revealed a large but consistent number of areas which needed to be considered for inclusion in the simulator, for example, marketing, production planning, organisation structure, job design, personnel management, corporate finance, and cash management. Importantly, the list contained areas which had not been incorporated in existing business simulation systems, especially in the human resources management area, where soft, less quantitative factors, were important. However, in these and many of the other areas it was thought feasible to draw on information from recently completed research into the relationship between the financial performance of construction firms and features such as their organisation structures and the characteristics of their human resources

(summarised in Lansley, 1987; Lansley 1994). In due course this did prove to be possible. So, in brief the specification was developed by working very closely with the community for which the materials were to be developed, in terms of understanding what constituted an effective learning experience and the areas and type of issues which needed to be embodied into the simulator.

## Development

The resulting conceptualisation of the simulator was that of a business policy orientated case-study introduced by some form of audio-visual presentation and supplemented by documentary evidence, followed by a computer assisted simulation providing information about a firm and processing decisions about how it was to be managed.

Whilst the development of the case study materials proved fairly straight-forward, that of the computer based simulation system was to be much more challenging. Initial work leading to the first prototype was developed in Fortran on a PDP16 using remote terminals. Whilst a satisfactory main frame system was developed, its use was limited to one location.  However, the introduction of the PC in the early 1980s, removed the major constraint of the lack of portability of the system. By rewriting the system in Basic initially for Victor 9000/Sirius PCs and subsequently IBM PCs, the resulting system became available for use on courses in almost any location, not just at a management college. In 1982 the typical set of equipment needed for each team involved with a course was a PC with two floppy drives and 256K of RAM, a dot matrix printer and several reams with multiple-part paper.

As the capability and capacity of PCs grew so the system developed to reflect these advances. However, the basic structure of the system remained unchanged even with the development of a Windows version. Through successfully incorporating a contemporary user environment this has continued to support the original conceptualisation and philosophy of the system.

Within five years of its release the AROUSAL system had been obtained and used by a dozen commercial organisations, not all of which were in construction, eight universities, and four national training agencies, which in turn had used the system with very large numbers of companies. The users were based in five countries but because some of these were international organisations the system was used by managers in over sixty countries. Subsequently the system has been obtained and used by numerous companies, universities and training organisations throughout the world. Over the years many of these users have kept abreast of developments and currently use the latest Windows version.

## EVALUATION

### Quantitative reviews

The evaluation of a training approach can take many forms. For an approach which has been so long lived it might be expected that conventional forms of evaluation would be positive, for example the evaluations made at the end of a course and some months afterwards. Another indicator would be the extent to

which the system is used repeatedly, especially by construction firms which have a natural reluctance to pay for training. Some organisations have continued to use the system since acquiring it, in some cases for nearly 20 years. Other organisations, which have discovered the system more recently (largely through word-of-mouth or the web as the system is not actively marketed), have been sufficiently interested to use it despite its aged provenance. However, whilst supporting the notion that the system makes a useful contribution, such outcomes say little about why the system is viewed as useful. Here it is necessary to turn to qualitative and somewhat anecdotal evidence.

## Qualitative reflection

For some early users, the value of the system was in its strong focus on contemporary issues affecting construction firms. It was this focus which led to the system receiving a major UK innovation award in 1997 (Huntley, 1987). Also, underlying the positive evaluation of the system are statements from user organisations, such as:

- *The greatest learning takes place when managers are able to handle new ideas against the backcloth of a familiar business setting.*

backed up by belief about the how the system has contributed to developing their staff

- *The effective manager has to integrate a wide range of skills and operate across the full range of problem levels*
- *An effective manager is able to forecast the outcomes of his actions and so take specific actions to keep control.*
- *Management effectiveness is best measured by quantifiable results.*

These reflect a sensitivity on the part of those making the quotations about the importance of:

- providing supportive contexts for learning
- recognising the nature of the management task, and
- understanding the way in which the manager's performance is evaluated.

Importantly the system has been able to accommodate a wide range of information much of it not amenable to simple forms of codification or diffusion. In some cases this has been about the firm which is the focus of the case study and simulation. But this applies especially to the way in which individuals share information, their experiences, their understanding of the world of business and how to solve problems. This has encouraged the development of a rich information environment enabling individuals to find a path through this environment suited to their needs and learning style. This feature has figured significantly in the feedback from participants about the sources of learning during both the experiences, of the case study and the simulation.

The flexibility incorporated into the system to meet the needs of different types of learner and the different working environments and contexts of users has also provided a flexibility to accommodate changing needs of organisations. Most of these have been brought about by fundamental changes in the context of their businesses and in corporate cultures.

For example, in 1982, when the system was launched, training in the construction industry had been seriously neglected, the result of a protracted recession which followed a major depression. Careers had stultified and many of those moving into senior positions had poor knowledge of business functions, organisation and strategy and very weak general management skills. Generally, however, there was a good understanding of the business of the employer and there were strong and distinctive company cultures. By 1990, a time of recession following a major boom, management training had become more accepted, indeed viewed as vital to some firms. General management knowledge and skills were stronger. However, due to increased mobility during the boom, company cultures had become less distinctive and understanding of the broader business of employing organisations was weaker. By 1996, a period of recovery, training had been neglected during the preceding recession, knowledge and skills had weakened and company cultures had become indistinct. Yet at all three junctures, despite being faced with quite different challenges, the system was appraised as very effective in supporting the learning needs of managers in the industry.

It should be noted that by 1996 IT and computing systems had developed beyond all recognition compared with 1982. Most managers were familiar with and comfortable with modern IT systems and impatient with the older systems of the 1980s. Yet the original system software was still in use, with few modifications. However with its focus on general management skills and with a strong dimension on business planning and strategy, the system continued to be seen as useful in meeting the development needs of managers. Participants viewed the technology as relatively unimportant, although doubtless it was irritatingly traditional for some of them, whilst the system's sympathy for the learning remained attractive to users. In due course a Windows version of the software was developed bringing the system into line with contemporary expectations. But because the software incorporated features which by then were common place it enabled the technology to sit in the background further facilitating the experience of learning about the general management of the simulated business.

**CONCLUSIONS**

Throughout this paper has been a recognition, that the design of learning materials has to recognise the context in which an individual operates and the skills and resources of the individual. The starting point of the learning experience has to be their world not that of the designer of the learning materials. Experience has shown this to be the case especially for mid-career managers in the construction industry. Often because they have not experienced further or higher education they have not had the opportunity to develop their cognitive and reasoning skills in a formal manner, although they may have developed these in other ways. Their approach to learning is often rooted in familiar contexts, and couched in familiar language, Surprises, technological, in context or content, can severely hinder the progress of their learning. On the other hand, when used with those who have benefited from advanced education, where there may be more familiarity and confidence in handling new technology, context and content, these are not issues. Mostly, however, concerns about management development in the construction industry are not centred on the most able quarter of managers, who are

capable of developing themselves, for example following higher degrees with major intellectual challenges. Rather it centres on the remaining three quarters who are more likely to be deterred by technology, language, and unfamiliar context and content.

The essence of this paper has been to propose the central importance of understanding learning processes to the development of learning materials concerned with the creation of strategic management skills which are dependent on the use of modern technology, for example e-learning systems. It has reviewed the development and design of a simulation system for developing managers and, although objective evaluation is difficult, it has suggested that its success has come from the careful way in which the needs of learners have been addressed. The focus of the AROUSAL system is quite clearly on complex and strategic decision making skills, and it is within this general area that its lessons have the greatest validity.

Although it could have laid a false trail for others, the success of AROUSAL should encourage developers of new systems and materials concerned with the development of similarly sophisticated skills, to invest time and energy in understanding how people learn. Whilst this may take them into unfamiliar territory this could lead to systems which can withstand the wide variety of challenges which characterise training activity within construction. The approach taken for the development of AROUSAL will have less relevance for the creation of, say, e-learning systems concerned with just a single business function such as marketing or finance and those areas which are not concerned with developing skills, attitudes or behaviours, but with imparting basic factual knowledge. Even so, in these areas recognition of how people learn will be important. Nevertheless, many current e-learning materials and systems are unsympathetic to the specific needs of the individual learner. This need not be the case.

Some developers argue that because they employ technologies and devices which are common place for many managers the technology will not hinder learning, indeed it will become almost invisible. However, this confuses a mechanical proficiency of a user in using the technology with the facilitation of their learning by those systems. Indeed, it could be argued, even if technology is not constraining, much more could be achieved by developing systems even further to recognise and accommodate different styles of learning.

The biggest constraint however, is that the starting point for many e-learning systems is that of the independent learner working at a distance from tutors, peers and other participants, although there may be e-contact with these. This immediately limits the flexibility of the systems and their ability to appeal to the full range of learning preferences. It also limits the way in which information is codified and diffused, and thus is likely to be interpreted by users. Thus, there is a danger that no matter how well crafted these systems might be they will not appeal to many of those who would benefit from development courses. As a result they may reject such systems. Eventually the systems may be judged of marginal value, even discredited and the developers, as well as users, may feel that they have wasted their time.

The construction industry needs well designed training systems which are sympathetic to its particular circumstances and to its employees, for whom effective development relies on a recognition of learning preferences. The experience of AROUSAL has been to challenge the stereotype view of an industry disinterested and not prepared to pay for training. Rather, it suggests that the industry recognises those approaches which embody an understanding of construction, and its managers and employees, and will offer a sincere commitment to those who can meet the challenges of developing materials which will be valued by the industry.

## REFERENCES

Devine, M (1986a) A taste of the Boardroom, *AM*, pp. 7-8

Devine, M (1986b) Management through the looking glass*, Manpower Policy and Practice,* Winter, pp. 5-6

Honey. P. and Mumford, A (1982) *Manual of Learning Styles*, London, P. Honey

Huntley, C (1987), Building Innovation Award, *Building*, 6 January, pp. 67

Kolb, D.A (1974), On Management and the Learning Process, in Kolb, D.A., Rubin, I.M. and McIntyre, J.M.*, Organisational Psychology: A Book of Readings*, Prentice Hall.

Lansley, P (1982), "AROUSAL": A Model to Match Reality, *Journal of European Industrial Training*, vol 6, no 6, pp17-21

Lansley, P (1987), Corporate Strategy and Survival in the UK Construction Industry, *Construction Management and Economics*, 5, pp141-155

Lansley, P (1994), Analysing Construction Organisations*, Construction Management and Economics*, Vol 12, No 4, pp337-348

End note:
Further details of the AROUSAL Simulation System can be found at www.managementreality.com and www.rdg.ac.uk/arousal.