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## **ECOLOGICAL LANDSCAPE PLANNING: A GAMING APPROACH IN EDUCATION**

**Gill Lawson**

Associate Lecturer  
Landscape Architecture  
School of Design and Built Environment  
Queensland University of Technology  
GPO Box 2434  
Brisbane QLD 4017  
Australia  
[g.lawson@qut.edu.au](mailto:g.lawson@qut.edu.au)

# Ecological Landscape Planning: A Gaming Approach in Education

GILL LAWSON

**ABSTRACT** An understanding of the complex problems of land use competition requires an appreciation of natural processes, cultural values, economic imperatives and political agendas. This integrated understanding is an important component of the study program for tertiary students about to complete their professional qualification in landscape architecture at the Queensland University of Technology. This paper introduces a repertoire of game templates as an initial step in formulating a conceptual framework for the curriculum/games designer to explore the potential of play in ecological landscape planning. The concepts of social action space, permissible action space and motivational action space are used to investigate the qualities of each template for further game design development. The abstraction of these concepts may assist the designer to move beyond the usability of games into viewing their value as a learning method.

**KEY WORDS:** landscape planning, education, games, repertoire.

## INTRODUCTION

In order to develop a gaming approach for adult social play in landscape planning, the reflective practitioner can look to pre-existing game formats for a larger tradition in design. Löwgren and Stolterman (1998) have argued that a thorough and reflective process of developing a repertoire of generalised examples of IT designs could improve a designer's capability. The nature of this repertoire of templates could therefore be understood as the designer's conceptualisation of their own design experience. Hence this paper argues that a generalised and condensed interpretation of some game examples can give an insight into the early formative design judgements of games appropriate to the study of ecological landscape planning within landscape architecture.

Ecological landscape planning has been defined by Nubisi (1997) as the integration of scientific and technical knowledge as a basis for providing options to make decisions about alternative futures for landscapes. Understanding the complexity of common problems of land use competition requires an appreciation of natural processes, cultural values, economic imperatives and political negotiations. The dominant traditions in this field are physical and cultural geography. The notion of a gaming

approach to land use problems in geography is not new but the expansion of the learning context from the classroom, supplemented by the reality of fieldwork, to include virtuality, is an exciting development.

In this paper, play is investigated as a method for adult learners to develop an integrated understanding of the physical and cultural processes in land use planning. It may offer an opportunity to facilitate conceptual change from local to regional settings, an important component of the study program for tertiary students about to complete their professional qualification in landscape architecture at the Queensland University of Technology (QUT). The process of developing a repertoire of game designs that support conceptual change in learners will comprise an initial step towards a conceptual framework for play in landscape planning.

## **INTERPRETATION OF THE REPERTOIRE**

The selection of game designs for this repertoire focuses on the relationship of the players, the virtual, the actual and the real landscape. Levy (1997) defined *virtuality* as a complex of trends, tendencies, constraints, goals and forces forming a general problem. In contrast, *actuality* was considered as an unforeseen answer to the virtual problem or what may be possible. Furthermore, actuality may then sometimes be transformed into *reality*, what we share or perceive in common in the world around us. Examples of finished designs of games that illustrate the actualisation, the creative problem solving process, of a virtual problem possibly drawn from a real landscape, can be studied from many perspectives.

The most common perspective is the use qualities of games. Stoney and Oliver (1998) described eight attributes of an interactive multimedia learning environment that influence the motivation and engagement of adult learners. These included immersion, reflection, play and flow, collaboration, learner control, curiosity, fantasy, and challenge. Poole (2000), in his book on 'the inner life of videogames', also confirms the importance of these qualities as he explores the possible reasons for the popularity of numerous virtual games. Usability, however, does not adequately describe the qualities needed for teaching and learning in a virtual environment.

While the usability of games is important, a further perspective used for evaluation is the value placed on learned knowledge in play. Players learn to act according to the rules of the game but what are

they learning? As in other learning environments, experience of the creative problem solving process in the virtual landscape is constrained by the implicit or explicit values framing the play.

Interpreting game design from an understanding of the values embedded in the rules aims to determine the underlying bias or agenda of the games associated with decision-making. In considering the bias orientation of selected games, examples are analysed and interpreted using categorisation to develop a repertoire that makes the hidden cultural message explicit. The templates presented should be read as early representations of a conceptual framework for exploring the potential of play in land use planning and have been described in four categories: learning games, territorial power games, trade off games and land strategy games.

## **Learning Games**

Leigh and Kinder (1999) have outlined a range of games for teachers, facilitators and managers to assist in providing opportunities for experiential learning, one approach to learning. This work has focused attention on the reasons for using play in the learning process for individuals and groups, the goals to be achieved and the reflective approach to implementing play in the learning context. The games are structured according to categories such as: games promoting trust and problem solving; development of specialist knowledge; communication and negotiation; navigation and orientation; and process formulation and understanding. The settings for these games range from the classroom to field sites, making some of them suitable for landscape planning (figure 1). Leigh and Kinder (1999) have strongly advocated that players with differing capabilities and limitations be considered as part of the rules of the game designs.

## **Territorial Power Games**

Mukerji (1997) has suggested that success in many games has been based, either explicitly or implicitly, on the use of environmental knowledge to strategically gain power (figure 2). Many of these games have been organised around settings that offer a framework for positioning elements based on technological and engineering opportunities. Players are offered options to make interventions that gain control of landscapes, with lesser emphasis on appropriate land management options for future human habitation. This method is based less on a logic of play that requires players to see the landscape as an entity to value and leave behind for future generations. It is based more on the logic that the landscape is a means to an inclusive or exclusive end. Mukerji (1997) further proposes that

these games make manifest what is powerful in a technologically defined future by making this seem 'natural', not a matter of power.

## **Trade Off Games**

Robinson (1987) has described the potential of trade off games as a tool for environmental design research. Although these are not games in the typical sense, ultimate success for players depends on their motivation for an economic solution to balancing environmental preferences (figure 3). Three examples are based on: community preferences for services, housing preferences for new towns and environmental preferences for site use. In these games, the settings typically consist of an area of land, at multiple scales, characterised by a set of environmental attributes such as topography, natural resources, social values, cultural settings, property holdings, public services and political jurisdictions. Players are allocated a set of resources, financial or physical, and are allowed to trade or purchase further allocations of these resources. By allocating resources in a manner that does not allow any one player to trade or purchase the highest or 'best' set of resources, trade offs must be made. This method is based on the economist's theory of 'utility' (Houthakker, 1961, cited in Robinson, 1987) that aims to address the question: for a given set of resources, what combination of attributes will yield the greatest level of satisfaction for players?

## **Land Strategy Games**

Wood (1973) outlined the structure of games that allowed various land planning proposals to be tested as players make decisions in relation to land acquisition, a culturally biased view of land ownership (figure 4). In these games, the settings are typically characterised by scale. The nature of the competition for land in a regional setting depends on a vast number of parcels of varying size and ownership being transacted by competing general interest groups such as: local governments, industries, real estate developers, environmental action groups and indigenous communities. In a local setting, specific interest groups are represented, including individual landowners. Players are allocated capital and bid for areas of land at current market prices. Chance factors, both positive and negative, can alter the game at the end of each round of bidding. Wood (1973) proposed that the game ends when all land has been bought and no further land deals are possible. These games, originating from the traditional geographical approach, challenge players to reflect on physical land use as well as territorial land users. Furthermore, play in this learning context can promote further

inquiry in areas such as the generalised choices of locations of interest groups, the role of government, the survival capabilities of commercial landowners and the influence of pressure groups.

## **QUALITIES OF THE REPERTOIRE**

The repertoire of games aims to re-interpret the social nature, interactive structure and motivating factors of existing play spaces. The four generalised templates are explored to assess their intrinsic values as compared to those of the designer. By reflecting on what players learn from each type of game design, the designer may look beyond their use qualities and begin to think about the further development of games suitable for landscape planning.

### **Social Action Space**

Every game included in the repertoire has been designed with the aim of changing the way participants act under a certain set of circumstances. This has been described as the design of the social action space in which social activity patterns of players are changed or reinforced (Löwgren & Stolterman, 1998). Learning games, for instance, often emphasise human interaction between players in the actualisation of virtual problems. Territorial power games sometimes offer opportunities for negotiating the control of virtual landscapes between players. Trade off games focus on trading resources for agreed outcomes between individuals while land strategy games often test the decision-making abilities of teams and the ethics of their decisions.

The possibility of social play in online videogames is reportedly gaining in popularity where users can connect games to an Internet server and play in real-time with many others in locations worldwide. Attention is focused on the players themselves where the action space incorporates alliances, deceptions and humour (Poole, 2000). Budd, Vanka and Runton (1999) found that electronic conferencing in an online design studio facilitated an increased level of interaction attributed to an enhanced sense of community. The social action space of game design, thus, reflects the underlying social values of the designer.

A major goal for the game space in landscape planning will be to generate enthusiasm for learning in this field by facilitating a social learning environment, based at least in part, on inclusivity, debate, co-operation, communication and negotiation between team members. This approach will aim to simulate appropriate professional behaviour in practice.

## **Permissible Action Space**

The framework for game design comprises the goal, the obstacles, the resources, the rewards, the penalties and the diversity of information available to players to define the permissible action space (Löwgren & Stolterman, 1998). In reflecting on the structured nature of the games in the repertoire, these elements are often combined to optimise the interactivity between players and the game. Learning games may use challenging activities anchored to the prior experiences of players. Territorial power games may allow players to experience the positive and negative impact of their decisions on an imaginary world of relevance to them. Trade off games may challenge players to discover their own intrinsic values when faced with a finite resource base. Land strategy games may create the exhilarating illusion of control for players monitoring their own interests in land acquisition.

Many videogames have been developed from existing game formats. The success of racing games, God games, real-time strategy games, role-playing games and puzzle games have provided useful structured approaches for recombinant games and games within games (Poole, 2000). The level of inclusivity and interactivity, however, is highly dependent on the degree of difficulty and the distribution of rewards, often linked to the nature of the relevant technology. It can be argued that all games rely on some level of technology from paper-based resources to high-speed computers. The concern is that the permissible action space of some play environments may not match players' differing capabilities and limitations. The question, then, is how to adapt the game to the broad spectrum of knowledge and experience of the players and provide motivational rewards to engender learning at a deep connective level in individuals and teams?

A further goal for the gaming approach to landscape planning, then, will be to use pre-existing formats in the repertoire to offer similar goals and rules to professional practice. The game options will aim to provide shared visions for future landscapes, chance obstacles, financial resources, point rewards and penalties towards assessment and an information rich environment for student players.

## **Motivational Action Space**

As Stoney and Oliver (1998) have suggested, designers of multimedia environments for adult learners have provided far less appealing and engaging interfaces and content than those for children. Traditionally, game play in adult education has been seen as a childish pursuit. As universities come

under pressure to be more competitive and cost-effective, however, interactive student-centred learning environments are receiving greater attention.

Indeed debate rages over whether media influences learning at all. Nathan and Robinson (2001) have compared the arguments of Richard Clark, beginning with his 1983 article in *Review of Educational Research*, and Robert Kozma, based on his article in 1991 from the same journal (Clark, 1983; Kozma, 1991). It has been argued that although these researchers disagree about the effects of media on learning, they both support the premise that learners need the cognitive support of a learning environment that assists them in incorporating new knowledge into their existing knowledge and skill base. The challenge in game design is to match the three educational domains of cognitive objectives, affective objectives and psychomotor objectives as discussed by Graves (1977, p. 91) with media or method that appeal and encourage student participation in learning experiences.

The games in the repertoire illustrate various methods by which players may be motivated to interact with play spaces. Learning games focus attention on cultural norms, player readiness and organisational practices (Leigh & Kinder, 1999). Territorial power games may use a range of factors such as inventive modelling of physical laws; reliability of causality of action, functionality of objects and spatial limits; separation from reality through sensory controllers and intuitive interactions; multiplicity of viewpoints and fabulously detailed landscapes for escape tourism (Poole, 2000). Trade off games contribute less to intrinsic player motivation. Players may be engaged by the repeated opportunities for altering choices until some compromise position is reached with the player's 'opponent' (Robinson, 1987). Land strategy games foster involvement when players seek to examine decision-making processes related to the world around them. They offer the opportunity of experiencing the probable impact of attitudes, roles and behaviour in social settings, a major attraction for many landscape architects (Wood, 1973).

Factors contributing to player motivation in games may or may not be the same as the intrinsic motivation for learning. Thomas and Macredie (1994) have described eight factors implicated in computer games: challenge, fantasy, curiosity, control, novelty, complexity, surprise and competition. Stoney and Oliver (1998) have offered a somewhat modified set of factors for intrinsic learning that substitute novelty, complexity, surprise and competition with immersion, reflection, flow and collaboration. It is feasible that games aimed at acquiring new knowledge will never be as engaging



for extrinsically motivated learners as recreational games. Who wants to come home and play a game devoted to work? Despite this, richer environments for active learning should improve the pleasure associated with the majority of passive click-and-read learning media. An exciting area of research is whether more pleasurable media can combine to support teaching practice and foster conceptual change in learners.

A goal for potential games from the repertoire for landscape planning will focus attention on evaluation before, during and after the game series. Learners may express greater levels of pleasure and satisfaction in their learning experiences but without evidence of a conceptual change, games may offer no greater pedagogical benefits than other approaches. Game designs will aim to build in evaluation mechanisms to address these issues.

## **DEVELOPMENT OF DESIGN ABILITY**

This paper proposes a repertoire of game designs that support conceptual change for learners in ecological landscape planning. In proposing one interpretation of templates suitable for this context, particular attributes have been abstracted as discussed by Löwgren and Stolterman (1998). The way players determine their appropriate social behaviour, the frameworks that define the context for this behaviour and the characteristics that influence the nature of this experience, have been abstracted into action spaces. These concepts may assist the reflective curriculum/game designer to go beyond the use qualities of various games to support learning.

Further development of games for landscape planning from the existing templates may first attempt to determine and debate the likely values and concepts embedded in the game designs of the repertoire. Design ability may be improved with these insights that sensitise the designer to their own values and biases promoted in the content and interfaces of their games. A second step may be to construct games to involve students in alternative interpretations of games to produce games within games. This may serve the purpose of discovering students' concepts and ideas through game-making. A third option may be to compare the action spaces of the curriculum designer's games, student designers' games with other games to capture the optimum mix of ideas for the particular learning context. Thus while the character of the spaces may not quite capture the complexities of the 'real world', they may assist students in landscape planning to develop a clearer actualisation of a virtual problem.

Play spaces may offer opportunities for pleasurable interactions between players, changes in their understanding of concepts and an escape from the physical limitations of traditional learning environments. It would seem that the problem of integrating existing knowledge with new knowledge of options for decision-making in ecological landscape planning would lend itself well to a gaming approach. Landscape architecture students may come to experiment with alternative roles in attempting to resolve planning issues in regional settings, not merely as designers of scenery but as treasurers, system mechanics, deconstructors and visionaries, as described by Van Blerk (1999).

## **CONCLUSION**

This paper has proposed the development of a gaming approach for adult play in landscape planning. It has described a repertoire of learning games, territorial power games, trade off games and land strategy games that offer qualities that may support conceptual change in learners. The templates included in the repertoire are intended as early representations of a conceptual framework for investigating the potential of play in exploring alternative futures of landscapes.

An assessment of game designs based on social, permissible and motivational action spaces, as suggested by Löwgren and Stolterman (Löwgren & Stolterman, 1998), has been investigated to focus attention on the qualities of the games appropriate to the learning context in this field. A number of goals for further game design have been suggested, including: facilitating an inclusive social learning environment, framing rules and objectives around professional practice and incorporating evaluation mechanisms to monitor user engagement and/or conceptual change in learners.

The emphasis on templates should not be read as a focus on variations or incremental changes to existing designs or common approaches (Löwgren & Stolterman, 1998). They aim to provide a framework for analysing and abstracting game qualities, thus creating a broader range of play spaces that may be considered for future innovative design. Just as further research work is born from previous theory, so to is further design work born from previous design concepts. Thus a repertoire of game designs (actuality) and landscape planning problems (virtuality) may foster creative alternatives for future landscapes.

## REFERENCES

- Budd, J., Vanka, S., & Runton, A. (1999) The ID-Online Asynchronous Learning Network: a 'Virtual Studio' for Interdisciplinary Design Collaboration. *Digital Creativity*, 10(4), pp. 205-214.
- Clark, R. E. (1983) Reconsidering research on learning from media. *Review of Educational Research*, 53(4), pp. 445-459.
- Graves, N. J. (1977) *Geography in Education* (London, Heinemann Educational Books).
- Kozma, R. B. (1991) Learning with media. *Review of Educational Research*, 61(2), pp. 179-211.
- Leigh, E., & Kinder, J. (1999) *Learning through fun & games* (Sydney, McGraw Hill).
- Levy, P. (1997) Welcome to virtuality. *Digital Creativity*, 8(1), pp. 3-10.
- Löwgren, J., & Stolterman, E. (1998) Developing IT Design Ability Through Repertoires and Contextual Product Semantics. *Digital Creativity*, 9(4), pp. 223-237.
- Mukerji, C. (1997) *Territorial Ambitions and the Gardens of Versailles* (Cambridge, Cambridge University Press).
- Nathan, M., & Robinson, C. (2001) Considerations of Learning and Learning Research: Revisiting the 'Media Effects' Debate. *Journal of Interactive Learning Research*, 12(1), pp. 69-88.
- Ndubisi, F. (1997) Landscape Ecological Planning, in Thompson G. F. & Steiner F. R. (Eds) *Ecological Planning and Design*, (New York, John Wiley & Sons).
- Poole, S. (2000) *Trigger Happy: the inner life of videogames* (London, Fourth Estate).
- Robinson, I. M. (1987) Trade-off games as a research tool for environmental design, in Bechtel R. B., Marans R. W. & Michelson W. (Eds) *Methods in environmental and behavioral research* (pp. 120 - 161). (Florida, Robert E. Krieger Publishing Company).
- Stoney, S., & Oliver, R. (1998) Interactive Multimedia for Adult Learners: Can Learning Be Fun? *Journal of Interactive Learning Research*, 9(1), pp. 55-81.
- Thomas, P., & Macredie, R. (1994) Games and the design of human-computer interfaces. *Educational and Training Technology International*, 31(2), pp. 134-142.
- Van Blerk, H. (1999) A Carnival of Landscapes, in Blerk H. V. & Dettmar J. (Eds) *Landscape - 9+1 Young Dutch Landscape Architects* (pp. 8 - 17). (Rotterdam: NAI Publishers).
- Wood, C. J. B. (1973) *Handbook of Geographical Games* ( Vol. 7) (Canada, University of Victoria).