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PLAYING THE KING ALFRED'S GAME: AN EXPLORATION OF PROBLEM-SOLVING PROCESSES

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The King Alfred's Game was originally devised as an introduction to problem-solving for students in the first year of a BA course. It was developed in response to a number of perceived needs:

- i) to provide a base experience of problem-solving which demonstrates its use as a generic framework for achieving outcomes
- ii) to establish at an early stage in the course that students' understanding of problem-solving should not be tied to a particular form of activity (in this case designing)
- iii) to offer a concentrated experience of the various ways in which the nature of a problem, and/or the way in which it is formulated, can influence the response to it
- iv) for students to develop a set of concepts about problem-solving and about themselves as problem-solvers, by giving them material for observation of themselves as problem-solvers which will help undermine possible preconceptions about process
- v) to provide a staging point to which reference can be made through subsequent phases of the development of their reflective understanding.

The format of the game gives players opportunities to experience a range of types of problem. Participants are offered a variety of problem-solving experiences within a structure which entails the performance of various sub-tasks in order to achieve a goal whose definition involves them in some value-judgements. Players are asked to keep a record of decisions they make as the game progresses. Some of the 'problems' are explicitly articulated (the tasks), others are implicit in the game (time management, group process, and so on). There is a period of reflection at the end of the game, in which the game managers and the participants together reflect on the experiences. The starting point for this reflection is the presentation by player groups of their final outcomes together with a 'map' of their decision route through the game. We explore answers to some key questions: does the nature of the problem define the strategy of approach? how easy is it to keep the ultimate goal in mind? did the players clearly identify their ultimate goal? at what stage? how useful can this artificial structure be for learning about our process skills? This debriefing session is an essential component of the game. It needs to take place immediately after the game and also to be revisited subsequently, as part of longer term reflection.

The structure of the game

There are game 'managers' (in our case, tutors) and game players. Players work in small groups, usually of 3 or 4. The managers present the game to the players explicitly as an opportunity to experience and reflect on aspects of problem-solving. Players are then provided with a 'worksheet' (see Appendix 1) which offers a definition of the goal task, and explains that in order to achieve this, materials will be needed for which a tariff of credits has been drawn up. In order to 'purchase' materials, players must provide themselves with credits by fulfilling a number of tasks. The tasks, and the materials, are differentially credit-loaded, so that each group of players must work out their own strategy to manage their economy, of time as well as of credits.

As we developed and refined our ideas, we realised that the game has a flexibility which allows it to be modified in a number of ways:

DATER 90

The number and type of possible sub-tasks and the definition of the final goal can be changed to suit the players.

There can be different goals and ways of presenting the goal (we have used the construction of an artefact in some sessions, and a way of illustrating an important theme/concept in others).

Different 'rules' for earning/using credit can be incorporated, for example, credit tariffs can apply to equipment as well as materials, thus extending the mini-enterprise dimension.

Players can be asked to work individually or in groups.

The game can be compressed or extended into available time spans.

The game can be offered as a competitive activity.

We also came to recognise that playing the game can fulfil other functions:

By giving a clearly labelled joint experience, which is set aside from the 'normal' run of things, it encourages process dialogue within a group and can act as a team building experience.

By shifting attention from the product as outcome, we are able to lay stress more effectively on the process as outcome in learning terms: this can be particularly useful with task-orientated groups.

The game has now been run for a number of different groups including both "naive" (ie those relatively unaccustomed to reflecting on process) and highly sophisticated problem-solvers, in a variety of settings. These include:

First year students undertaking a new undergraduate course which prepares them through design activity for careers in either teaching or product design.

Two groups of Primary school teachers on an INSET course directed at the study of experimental problem-solving investigations.

A group of secondary teachers from National Curriculum D&T subject areas on an INSET course focussing on design process.

A mixed group of industrialists and educationalists with considerable experience of and expertise in problem-solving approaches.

Findings:

1. We were surprised by the extent to which the final goal was 'lost' in the pursuit of short-term rewards or perceived evidence of achievement. Most groups became so 'hooked' on the earning of credits through relatively closed problems that they spent more time on this phase of the game and earned far more credit than they needed. Even in the cases where groups had pre-planned their final response and estimated fairly accurately the number of credits that they would need, they too became locked into the credit earning tasks, finding it hard to move away from them. We observed a tendency to feel that activity is worthwhile for its own sake.

2. We were able to observe various ways in which the nature of the problem and how it is formulated influences responses: "the problem is the problem". Short term, tightly defined problems are experienced as attractive because there is an element of safety in working towards a goal that is in some sense measurable.

3. Connected with the above, we perceived a reluctance to spend time on sitting and planning and to recognise such time as valuable. Players felt the earning of credit to be a matter of urgency and gave it a higher priority than identifying how that credit would eventually be put to use.

DATER 90

4. Players also experienced a reluctance to undertake at an early point in the game activity requiring value judgements and decisions. There is also, we believe, a connection here with the first two points.
 5. Players tend to read more into the 'rules' than is required; there is an assumption that they must be taken as read, whereas our assumption as game managers has been that all aspects of the game are negotiable, but that the initiative for negotiation must come from the players. Notions of 'playing the game properly' vs 'cheating' may be related to previous schooling experiences in a culture of short-term rewards and competitive achievement.
 6. Another related observation suggests the unfamiliarity of lateral thinking. Most groups are able to assess whether a sub-task needs the whole group or only one member to achieve an outcome. However, few groups have reached a point at which they can realise that if a one-credit task only needs one group member to do it, then 3 credits could be earned by each member doing it separately, or that where a 'product' is required, extra credit could be earned by producing more than one. An example of this is a knitting task we have used with some groups, where players have assumed that it can only be done once and that it must be done separately from other activities, rather than as a sub-task during group planning sessions.
 7. It was also interesting to observe the influence of intuitive responses at earlier stages on subsequent design decisions. One group stumbled on a packet of balloons in the materials at their disposal. Having made a snap decision to use these to express their group identity, they then came to develop the use of balloons to express their central themes. Balloons became the medium and the message of their eventual presentation, which illustrated the holistic and fragile nature of the process of designing.
- Allowing space for recognising and valuing the intuitive can demonstrate the misleading nature of tightly sequenced design models. It can be used to make a group aware that they need consciously to draw on serendipity, not to be bound either by pedestrian precepts such as: "list three design proposals", or, on the other hand, by an unthinking reliance on a first and only idea.
8. A factor in most of the above findings seems to be that players have developed stock responses to certain words -eg "rules" become inflexible requirements; "construct" is assumed to mean "build physically".

Players who have so far encountered the game have all experienced the game itself as enjoyable and have found within it opportunities to build group loyalties and a sense of shared achievement. However in debriefing the game, following their presentations of outcomes to other groups, all have, to some extent, expressed confusion about the nature of the experience. In looking back at their gameplay, some are inclined to feel that they "have been tricked" into habitual responses which they now recognise as being unproductive. Sometimes the game managers are blamed for not having communicated the rules clearly enough. Again the assumption here is that those "in charge" should determine the course of events.

The most experienced group of problem-solvers was the most open to examining critically their own performance. They were unanimous in their appreciation of the opportunity the game offers to recognise aspects of their own practice which might need further exploration. They also acknowledged the value of an experience which could remind them of the ease with which received wisdom can be pushed aside in the pressures of the moment. At least one member of that group has subsequently adapted the game for use in a self-development exercise with colleagues. The central significance of the game lies in the flexibility of the basic framework. Players come to recognise that the learning zone which the game provides arises from finding strategies to deal with this framework, rather than from specific content within it.

The game is thus particularly useful for those engaged, or about to be engaged, in teaching NC Technology. It challenges preconceptions about the nature and purpose of "designing and making" activity in the classroom by providing an appropriately complex microcosm of process issues. The inevitable pull of content emphasis in the school syllabus is such that as teachers we need to keep returning to the central question of the differences between "knowing that" and "knowing how".

DATER 90

When presented by skilled facilitators, whose skill resides in part in being themselves process learners, the game requires players to examine the usefulness and validity of process models. It draws attention to the need to allow room for that essentially personal learning about process, which forms the basis of growth for design and technological capability. Without this personal learning there will be little chance of transfer of design and technology capability from one context to another. Substantial personal learning most readily takes hold as part of an explicit process dialogue with the self (through such devices as the design log) and other learners, among whom the teacher should be a "significant other", but not a dominant one. Initially this learning will probably need to be channelled through formally focussed conversation. Eventually it will be a natural and inevitable component of the discourse between those who are taking ownership of the praxis which resides within Design and Technology.

Giving serious status to "playing the game" can serve to highlight the concept of playfulness as a vital element of design problem-solving for teachers. It is a concept which needs to be protected as the activity of designing becomes increasingly institutionalised and formalised. Teachers of NC Technology need confidently to support those learners with the capacity to subvert the expected norm and not to reward only standardised responses. A concern for structured and systematic design strategies needs to go hand in hand with an acknowledgement of the intuitive, the spontaneous, the seemingly random. We need to allow,

"the deliberate, temporary relaxation of rules in order to explore the possibilities of alternative rules. When we are playful, we challenge the necessity of consistency."

March, J. Model bias in social action. Review of Educational Research, Vol. 42, 4, pp.413-29, 1972.

The necessity of playfulness as an ingredient of problem-solving is one thing. The usefulness of play as a vehicle for learning is another. It is by now a truism of the primary classroom that the role of play in learning must be acknowledged and exploited. However, the capacity of play to release alternative visions of how things might be can be sustained well beyond those age groups conventionally associated with play. Play can be used to provide, economically, in terms of time and space, specifically targetted learning experiences which nevertheless retain the capacity to surprise their constructors; the facilitators have to be ready for risk and uncertainty too.

Experiences released through play can be rich in learning because they are able to illuminate unexpectedly the darker corners of the learners' preconceptions. In providing, as the game does, the opportunity to relax the solemn and weighty constraints of daily routines, it allows individuals and groups to see differently the patterns inherent in their customary behaviours. Here the KAC game is echoing a methodology for learning which has elsewhere proved effective. In preparing executives to respond flexibly and imaginatively to the demands of change in the corporate environment, many industries adopt the methodology of play. This may be disguised in the form of elaborate simulations sometimes backed by sophisticated technology, or experienced through contrived encounters with the rigours of mountainside or ocean wave.

Writing of Shell's attempts to "find ways of learning by playing", despite the inhibitions inherent in the company culture, the Shell Group's Head of Planning emphasises the importance of play as a means of making explicit the mental models utilised by their managers. He stresses that it is vital to enable managers to recognise the mental models which they are imposing on reality, because it is only through that recognition that they can begin to intervene effectively to bring about desired change. Here,

" for the purpose of learning, it is not the reality that matters but the team's model of reality, which will change as members' understanding of their world improves."

De Geus, A.P. Planning as Learning. Harvard Business Review. March-April, pp.70-74, 1988.

DATER 90

To sum up, the King Alfred's Game helps make some process intangibles available for exploration. It pushes players towards a more explicit awareness of their own processes and thus equips them to develop more flexible strategies.