

# Higher Education Academy Imaginative Curriculum Guide

## Using Games, Simulations, Case Studies and Role-Play to stimulate students' creativity

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### Purpose

This is one of a series of guides produced by the Imaginative Curriculum Network to stimulate thinking and promote good practice in curriculum design. This Guide focuses on exercises of the game/simulation/case study/role-play type, showing how these can be used to develop creativity within a wide range of educational contexts. It is informed by the author's own experience of such exercises over the last 30 years, and by the extensive literature in the Field since the 1960s.

### Audience

This Guide is written primarily for:

- people who have institutional responsibility for leading developments in teaching and learning,
- people who lead whole course curriculum design and/or who help other academics to develop the curriculum,
- people who help other academics to develop their knowledge and skills about curriculum designing,
- tutors for the PG Cert HE teaching and learning course, and
- LTSN Subject Centres which are growing disciplinary knowledge of practice.

There is a companion 'Guide for Busy Academics'.

### Why should HE teachers be interested in creativity?

We live in a complicated and messy world in which work for most of our graduates is a continuous stream of 'problems' that have no simple or unique solutions. Helping the citizens of tomorrow to think creatively through exercises such as games and simulations will give them an invaluable headstart in preparing for this world.

**The SEDA booklet: *Using Games, Simulations and Interactive Case Studies*, by Henry Ellington and Shirley Earl, deals with such exercises in much greater detail, and constitutes a useful companion to this Curriculum Guide.**

### Introduction

As shown in the Curriculum Guide, *Designing for Creativity*, by Norman Jackson, enabling students to be creative is a worthwhile and desirable goal for higher education, and any programme can be vivified to make it more favourable to fostering creativity. This Guide shows how exercises of the game/simulation/role-play type can be used for such purposes within a wide range of educational contexts. The Guide is published as a working document, which means that we will continue to

shape it in response to user feedback. If you have any comments or suggestions for improvement, please forward them to [norman.jackson@ltsn.ac.uk](mailto:norman.jackson@ltsn.ac.uk).

## What are games, simulations, case studies and role-play?

Let us try to answer this question by giving a few basic definitions, and then showing how such exercises constitute a broad, overlapping field.

A **game**, first of all, is 'any contest (**play**) among adversaries (**players**) operating under constraints (**rules**) for an objective (**winning, victory** or **pay-off**)' (Abt, 1968). Thus, to qualify as a 'game', an exercise must have two basic characteristics, namely **overt competition** and **rules** (arbitrary constraints within which the players have to operate).

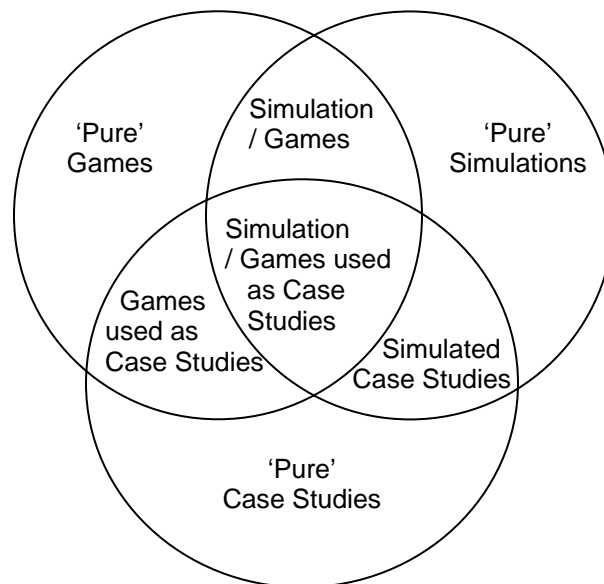
A **simulation**, on the other hand, is 'an operating representation of central features of reality' (Guetzkow, 1963). Thus, to qualify as a 'simulation', an exercise must again have two basic characteristics – it must represent a **real situation** and must be **on-going**.

Next, a **case study** is 'an in-depth examination of a real-life or simulated situation carried out in order to illustrate special and/or general characteristics' (Percival and Ellington, 1980). Thus, to qualify as a 'case study', an exercise must again have two essential features, namely **in-depth study** carried out in order to **illustrate particular characteristics**.

Finally, **role-play** is 'a technique in which participants act out the parts of other persons or categories of persons' (Ellington, Addinall and Percival, 1982). Although some people use the term to denote specific types of exercise, for the purpose of this Guide we shall regard it as a technique that is used within the context of exercises such as simulations, simulation/games and simulated case studies (see below) rather than a type of exercise in its own right.

## How are the basic types of exercise inter-related?

During the past 30 years, it has become recognised that games, simulations and case studies constitute a broad, overlapping field that contains exercises of a wide range of types. This can be represented by the following Venn diagram:



We see from this diagram that there are at least seven distinct types of exercise – three 'pure' types and four 'hybrid' types. Let us now illustrate these by means of examples.

1. **'Pure' Games** – exercises which possess both of the essential characteristics of games (**competition** and **rules**) but not those of simulations or case studies. **Scrabble** and **football** are two well-known examples, as are familiar card games such as **bridge**.
2. **'Pure' Simulations** – exercises which have the essential characteristics of simulations (i.e. are **on-going representations of real situations**) but not of games or case studies. Flight simulations and virtual-reality systems are good examples of the genre.
3. **'Pure' Case Studies** – exercises which have all the essential features of case studies (**in-depth study** carried out to **illustrate special characteristics**) but not of games and simulations. Conventional legal and medical case studies fall into this category.
4. **Simulation/Games** – exercises which have all the essential characteristics of both games **and** simulations. **Monopoly** and **chess** are good examples.
5. **Games used as Case Studies** – exercises which have all the essential characteristics of games **and** case studies. Simple gambling games such as coin-tossing and **craps** that are used as case studies in probability theory are good examples.
6. **Simulated Case Studies** – examples which have all the essential features of both simulation **and** case studies. The 'simulated patient' technique developed at M<sup>c</sup>Master University in Canada for use in medical training is a well-known example.
7. **Simulation/Games used as Case Studies** – exercises which have **all** the essential features of games, simulations **and** case studies. One of the best know examples is **Starpower**, a simulation of social class conflict developed at the Weston Behavioural Sciences Institute in California during the late 1960s.

In addition to the above classification by **function**, games, simulations and case studies are often classified by **format**. Here the most important distinction is between **manual exercises** (which do not involve the use of computers or other electronic devices for their delivery, management or execution), and **electronic exercises** which rely on the use of such devices). Manual exercises can themselves be classified into a number of distinct types, three of the most important being **simple-manual exercise** (which involve the use of nothing more complicated than simple resource materials such as role sheets and briefing booklets), **card games** (which involve the use of one or more packs of specialised cards of some sort), and **board games** (which are played on a specially-prepared surface of some sort).

### Why are such exercises useful to teachers?

Since the 1960s, exercises of the game/simulation/case study type have become more and more widely used at all levels of education and training. Let us now look at some of the main reasons why this is the case.

- They constitute a highly versatile and flexible medium whereby an extremely wide range of educational aims and objectives can be achieved, being particularly useful in achieving higher-cognitive objectives of all types (Ellington and Percival, 1977), affective objectives (Wentworth and Lewis, 1973), and interpersonal objectives (Marshall *et al.*, 1982).
- In many cases, they help participants to develop their initiative, divergent thinking, and creative skills (Ellington and Earl, 1998).
- They help to bring about positive transfers of learning i.e. the ability to apply skills acquired during the exercise in other situations (Twelker, 1971).

- They constitute a vehicle for helping students to achieve 'deep learning' in which they essentially transform new material by integrating it with previous knowledge and experience (Entwistle, 1996).
- Use of a simulated as opposed to a real situation as the basis of an exercise allows much greater flexibility in its design (Ellington *et al.*, 1981).
- Where competition is involved, this can constitute a powerful motivator (Ellington *et al.*, 1982).
- When exercises have a basis in more than one academic discipline, this helps the participants to integrate concepts from otherwise widely-related areas into a cohesive and balanced 'world picture' (Ellington and Percival, 1977).
- Multi-disciplinary exercises can also provide a vehicle for enabling participants with expertise in different subject areas to work together effectively in order to achieve a common end – excellent training for later life (Ellington *et al.*, 1981).
- Exercises of the game/simulation/case study type can prove extremely useful as assessment vehicles, particularly in those areas where conventional assessment is difficult (e.g. in assessing creativity or contribution to group work) (Brown and Knight, 1994).

### **Are there any drawbacks to the use of such exercises?**

Indeed there are! Like all teaching/learning methods, exercises of the game/simulation/case study type do have a number of potential disadvantages as well as advantages, and it is important that all potential users should be aware of these.

- Running such exercises can pose a number of organisational problems, not the least of which is the fact that it is often difficult to fit them into the normal teaching curriculum – especially if the exercise is a long one, or requires a large number of participants, extra teaching staff, special accommodation, etc. (Ellington and Earl, 1998).
- All exercises of this type require the **active cooperation** of the participants if they are to succeed, cooperation that may sometimes not be forthcoming due to some students not turning up or being reluctant to contribute (Ellington and Earl, 1998).
- There is always a danger of using such exercises for the wrong reasons – e.g. using them as 'diversions' or 'time-fillers' rather than for some specific educational purpose (Ellington *et al.*, 1981).
- If an exercise of this type is to be of any real educational use, it must not only be capable of achieving the desired educational outcomes but must also be properly matched to the target population with which it is to be used (Ellington and Earl, 1998). This may involve adapting or modifying an existing exercise or even designing a completely new exercise 'from scratch'.
- Although exercises of the game/simulation/case study type can constitute highly effective assessment vehicles, special measures will often have to be taken in order to ensure that such assessment is valid, reliable and fair (Brown and Knight, 1994). This may necessitate supplementing normal tutor assessment with peer assessment, or even self-assessment in some cases.

### **In what sort of contexts can games, simulations and case studies be used?**

Now that we have reviewed the general characteristics of games, simulations and case studies and identified their overall strengths and weaknesses, let us take a detailed look at some of the main

ways in which such exercises can be used in tertiary education, with the aid of illustrative case studies.

#### a) To reinforce the teaching of basic facts and principles

Although exercises of the game/simulation/case study type can be used to achieve educational objectives at all levels of Bloom's cognitive domain, experience has shown that they offer no real advantages over more traditional instructional methods in teaching the basic facts and principles of a subject. They can, however, be extremely effective in **reinforcing** the teaching of such basic facts and principles.

One exercise that was specifically developed for this purpose during the early 1970s was **Chemsyn**, a highly-sophisticated card game designed to reinforce the teaching of the basic principles of organic chemistry (Eglinton and Maxwell, 1971). The game package consists of a 24-page instructional booklet plus a pack of 52 numbered cards, each of which represents a different organic compound. Each card in the **Chemsyn** pack has a 'picture' side and a 'text' side. The former depicts a number of different representations of the structure of the particular compound, while the latter gives detailed information about its stereochemistry, basic properties, method(s) of preparation and reactions. The object of the game is to convert a random distribution of cards into an ordered sequence, illustrating the way in which the various compounds can be transformed one into another. It can be played either by a single person (solo **Chemsyn**) or by a group of 2-5 students (group **Chemsyn**).

A very much more detailed description of **Chemsyn** and its educational uses can be found in Ellington and Earl, 1998 (hereafter referred to as the '**SEDA booklet**').

#### b) To demonstrate applications of theory

Exercises of the game/simulation/case study type can also be extremely effective vehicles for **demonstrating the applications and relevance** of basic theories and principles, and in **providing illustrative case studies**. At tertiary level, simple manual and computer-based exercises are probably most suitable for this purpose. Such exercises can be incorporated into many courses as illustrative case studies, as an alternative to conventional 'worked examples' and as assessment vehicles.

A good example of a package that was designed specifically for such purposes is **Licensed to Drill**. This was developed by Phillips Petroleum during the mid-1980s as an aid to the teaching of economics at upper-secondary and tertiary levels (Ellington, Addinall and Caudill, 1986). The package consists of a video based on the development of their 'Maureen' field in the North sea, a 24-page booklet on the field and a 120-page Teacher's Guide dealing with the economics of offshore oil development. The latter incorporates a whole range of games, simulations and case studies on different aspects of the development process, some being manual and some computer-based. Most of these exercises are designed to demonstrate the application of specific economic principles on procedures, or to help students master sophisticated concepts such as internal rate of return on net present value.

A much more detailed description of **Licensed to Drill** and its educational uses can be found in the **SEDA booklet**.

#### c) To develop skills of all types

We have seen that games, simulations and case studies are extremely effective in helping students to develop **higher-cognitive skills** of all types, and also in assessing the achievement of such skills. They are particularly effective in helping them to develop multi-faceted skills related to such things as problem solving, decision making and creative thinking and in such cases, probably constitute one of the most powerful weapons in our educational armoury. In the author's experience, simple manual exercises and computer simulations and simulation/games are best suited for such purposes.

A good example of an exercise of the latter type is the **Bruce Oil Management Game**, a computerised simulation/game – based on the development of an offshore oilfield – that was originally devised in the Robert Gordon University during the mid-1970s (Ellington, Addinall and Laughton, 1978). This was run annually as a national (later an international) competition for school, college and business teams between 1974 and 1980. It was also used for over 20 years as an exercise for offshore engineering, business management and applied mathematics students within the University, thus demonstrating the flexibility and durability of the approach.

A much more detailed description of the **Bruce Oil Management Game** and its educational uses can again be found in the **SEDA booklet**.

#### **d) To support and supplement laboratory and studio work**

Simulations and simulated case studies can be used as a **supplement to**, and in some cases as a **substitute for**, conventional laboratory and studio work. The various types of mechanical/electronic training simulator have, of course, a long history of use in laboratories of all types, but the universal availability of microcomputers and networked workstations now means that students can be given direct experience (through simulations) of a far wider range of experimental situations than was feasible before they came on the scene. Computer simulations can also be used to allow students to 'try out' experiments before they carry them out 'for real', for example when designing electronic circuits, machines or buildings. Such computer-aided design now plays a key role in the teaching of a wide range of subjects.

One of the electronics lecturers at the Robert Gordon University makes regular use of computer simulations in this way, building them into his laboratory programmes in order to enable his students to use such simulations as an aid to the design and study of real electronic circuits. A more detailed description of how he does so can again be found in the **SEDA booklet**.

#### **e) Helping to develop library and research skills**

Exercises of the game/simulation/case study type can also be used to help students to develop their **library and research skills**.

One of the first exercises that was specifically designed for this purpose was **Polywater**, an interactive case study based on study of the research literature that was developed in Glasgow University during the 1970s for use with senior chemistry undergraduates (Percival, 1976). It is based on the controversy over the existence (or otherwise) of a polymeric form of water that raged in the scientific literature between 1966 (when 'polywater' was first 'discovered') and 1973 (when it was finally shown to be a spurious phenomenon caused by the leeching of impurities from glass). The exercise not only served as a case study on an extremely interesting area of chemical research and as a vehicle for developing useful library and communication skills, but also as a forceful demonstration that not everything published in learned journals is necessarily correct!

A more detailed description of **Polywater** and its educational uses can again be found in the **SEDA booklet**.

#### **f) To act as an 'icebreaker'**

One of the most useful functions of games, simulations and case studies – and particularly games – is to act as an **icebreaker** at the start of a course, conference, seminar, workshop etc. A large number of short, simple exercises have been designed specifically for this purpose (see, for example, Jones, 1992) and the author has found that a wide variety of other games fulfil the function equally well. Indeed, any short exercise that requires the participants to mix, interact and communicate will do – especially if it incorporates an element of 'fun'.

One of the exercises that the author has found particularly useful as an icebreaker is the **North Sea Auction** simulation/game that is described in detail in Appendix 4. This was originally developed as

part of the **Licensed to Drill** package described above, but has since been widely used by the author and his colleagues as an exercise in its own right. Detailed instructions on how to run the exercise, together with photocopy masters of all the necessary resource materials are given in Appendix 4. Readers are strongly encouraged to try it out for themselves – the author guarantees that it will work!

#### **g) To develop communication skills**

Participative exercises of the game/simulation/case study type are also ideal vehicles for helping students to develop their **communication skills** – particularly those associated with oral communication and presentation (Marshall *et al.*, 1982). A wide variety of exercises can be used for this purpose, those that involve the participants making oral presentations of some sort being especially suitable for developing these types of skills – and also for assessing them.

One exercise that has proved extremely useful in this role is **The Nuclear Debate**. This was originally developed as a linked series of case studies on Britain's nuclear power industry (Ellington and Addinall, 1981). The first two were highly technical, but the third consisted of a structured debate in which the various arguments for and against nuclear power were presented by the participants. For over 15 years, this was used within the Robert Gordon University as a vehicle for helping students in all types of courses to develop their oral communication and presentation skills and also for assessing these skills.

A more detailed description of **The Nuclear Debate** and its educational uses can again be found in the **SEDA booklet**.

#### **h) To develop interpersonal skills**

Another area in which participative exercises of the game/simulation/case study type have proved extremely effective is in helping students to develop all the various **interpersonal** and other **life skills** that they require in order to succeed in the outside world. Until the 1980s, comparatively little effort was made to teach such skills directly, but the influence of the 'competence' and 'enterprise' initiatives have led to their development being regarded as a vital part of tertiary education. Group exercises of all types can be used to develop such skills, with simulation/games and interactive case studies being particularly useful in this regard.

One exercise that has been specifically designed to develop general interpersonal, team and leadership skills is the **Offshore Survival Problem** (Earl, 1990). This assumes that a group of offshore workers have survived a helicopter ditching in the North Sea and have been able to salvage a number of personal items and survival items from a raft equipment. The object of the exercise is to rank these items in order of priority for survival, first on an individual basis and then as a team and to end up with an agreed ranked list.

A more detailed description of the **Offshore Survival Problem** can again be found in the **SEDA booklet**, which also contains all the instructions and resource materials needed to run the exercise.

#### **i) To achieve affective objectives of all types**

The general area of **affective development** – helping students to develop desirable and flexible attitudinal traits such as open-mindedness, empathy and willingness to appreciate other people's points of view – is all too often neglected in formal education because most affective objectives are rather difficult to achieve. It has, however, been found that games, simulations and case studies can be extremely effective in achieving such objectives, since they give the participants the opportunity to **experience** the situation being examined and to **feel what it is like** to find one's self in a particular role. Exercises that incorporate **role reversal** and force people to confront a particular situation from a different perspective from that which they would normally adopt are particularly powerful in this regard.

A good example of an exercise of this type is **Jimmy**, a role-playing simulated case study that was developed in the Robert Gordon University during the late 1970s in order to help break down the barriers between field social workers and residential social workers (Keenan *et al.*, 1981). It dealt with the various stages involved in taking an at-risk child into care and required the field social workers to play the roles of residential social workers and vice versa.

Once again, a more detailed description of the exercise can be found in the **SEDA booklet**.

### **Aids to help you use games, simulations, case studies and role-play with your students.**

If you are serious about using games, simulations or case studies with your own students, it is strongly recommended that you get hold of a copy of the **SEDA booklet** referred to throughout this guide: *Using Games, Simulations and Interactive Case Studies – a practical guide for tertiary-level teachers*, by Henry Ellington and Shirley Earl (SEDA Paper 101; 1998). This can be obtained from SEDA Publications, Gala House, 3 Raglan Road, Edgbaston, Birmingham B5 7RA, price £14 (inc p&p) within the UK.

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