National Unit specification: general information

Unit title: Artificial Intelligence for Games (SCQF level 5)

Unit code: FN8V 11

Superclass: CE

Publication date: July 2011

Source: Scottish Qualifications Authority

Version: 01

Summary

The purpose of the Unit is to provide candidates with an introduction to the use of Artificial Intelligence (AI) in games. Candidates will gain knowledge and understanding of intelligence and how games can simulate intelligence. Candidates will also have the opportunity to work as part of a team and become more aware of their own problem solving techniques.

This is an optional Unit in the National Certificate in Computer Games Development, but is also available for candidates wishing to study the Unit on its own.

Outcomes

1 Practice techniques used in problem solving.
2 Describe the use of AI within games.
3 Review the history and current application of AI in games.

Recommended entry

While entry is at the discretion of the centre, candidates would normally be expected to have attained one of the following, or equivalent:

F915 11 Computer Games: Design
FN8Y 11 Character Creation

National Unit specification: general information (cont)

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Credit points and level

1 National Unit credit at SCQF level 5: (6 SCQF credit points at SCQF level 5*)

**SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.*

Core Skills

Opportunities to develop aspects of Core Skills are highlighted in the Support Notes of this Unit specification.

There is no automatic certification of Core Skills or Core Skill components in this Unit.

National Unit specification: statement of standards

Unit title: Artificial Intelligence for Games (SCQF level 5)

Acceptable performance in this Unit will be the satisfactory achievement of the standards set out in this part of the Unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to SQA.

Outcome 1

Practice techniques used in problem solving.

Performance Criteria

(a) Respond to a given problem or scenario and provide a possible solution.
(b) Review the response and suggest an alternative solution.

Outcome 2

Describe the use of AI within games.

Performance Criteria

(a) Provide a brief explanation of intelligence.
(b) Provide a brief explanation of AI in games.
(c) Identify methods used to create game AI.

Outcome 3

Review the history and current application of AI in games.

Performance Criteria

(a) Investigate the history of AI in games.
(b) Create and present a timeline document of AI used in games.
(c) Present a case study of a current game that uses AI.

National Unit specification: statement of standards (cont)

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Evidence Requirements for this Unit

Evidence for **Outcome 1** is achieved by the candidate's participation in a given problem solving activity. The candidate must:

- recognise the problem
- take measures to deal with it
- manage to resolve the problem to some degree
- evaluate their performance
- suggest an alternative solution

The candidate will be allowed access to books, notes and on-line help if required while completing this activity.

The evidence for **Outcome 2** must be obtained under controlled, supervised conditions using questions in a closed-book test.

- explanation of intelligence must include description of intelligent beings and description of intelligence
- identification of at least three methods used to create game AI, which must include reference to at least three from the list of terminology below:
  - AI Agents used in games
  - algorithms
  - logic
  - knowledge bases
  - expert systems
  - search techniques

Evidence for **Outcome 3** is open-book where the candidates can access books, magazines or the Internet. Evidence must include:

- the creation of a timeline document of at least three key developments in game AI
- a case study presentation of a current game where the use of AI within a game has been explained

National Unit specification: support notes

Unit title: Artificial Intelligence for Games (SCQF level 5)

This part of the Unit specification is offered as guidance. The support notes are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 40 hours.

Guidance on the content and context for this Unit

This Unit is an optional Unit within the National Certificate in Computer Games Development (SCQF level 5), but can be taken as a free-standing Unit.

The purpose of this Unit is to introduce candidates to the use of AI in games. To successfully achieve this, it is necessary first of all to understand human intelligence and how intelligent beings react. By considering methods of problem solving, adapting to change, making choices based upon learning and experience, and communicating effectively, candidates will reach a knowledge and understanding of intelligent decision making processes which can then be related to the role of AI in games programming.

When investigating the use of AI in games the candidate should be able to become familiar with its use in a variety of game genres. Knowledge bases and simple search techniques could be explored, and the use of player and non player characters could be investigated, along with the responses made by each. An historical context should be taught to assist the understanding of how game AI has developed. In addition, the direction in which game AI is progressing, along with the recognition of technological changes over time should also be emphasized.

This Unit is aligned to the following Skillset National Occupational Standards (NOS):

- IM3 Prepare Assets for Use in Interactive Media Products
- IM6 Use Authoring Tools to Create Interactive Media Products
- IM8 Determine the Implementation of Designs for Interactive Media Products
- IM12 Devise and Evaluate User Testing of Interactive Media Products

Guidance on learning and teaching approaches for this Unit

Candidates should be given sufficient opportunities to develop an understanding of human intelligence. The study of AI in games by becoming familiar with terminology and the historical context of game development should also be encouraged.

Outcome 1

This Outcome should encourage exploration of intelligence. This can be a thought-provoking and stimulating topic to explore where candidates can learn about themselves and their own problem solving techniques. Tutors can utilise a range of games and puzzles in any format in order to demonstrate some of the features of decision making and logic; this can be from noughts and crosses, to chess, number games and much more complex games. Tutors can also encourage lateral thinking and set a series of problem solving activities. Class discussion and teamwork are beneficial to the delivery of this outcome.

National Unit specification: support notes (cont)

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Outcome 2

By participating in discussions and activities in Outcome 1, candidates should be able to define and have an understanding of what human intelligence is. By studying a variety of games they can then begin to understand some of the techniques used to simulate an intelligent response. This Outcome can be partially integrated with Outcome 3 where a historical context of game AI development can be taught. Tutors should encourage candidate led investigations which cover much of the terminology as outlined. There are many internet and text resources which can assist with this.

Case study examples can be identified by the tutor to highlight specific features of AI in games. For example, many PC based strategy games respond in characteristically conventional ways. Football and other sports games would constitute another genre of game to investigate, due to the large knowledge bases and variety of properties programmed to simulate intelligent responses to player action.

Outcome 3

Due to the range of information that is available for candidates to research, teamwork is recommended for Outcome 3. The tutor's role should be that of mentor rather than instructor and the candidates should lead this investigation. Collation and communication of information within the team should culminate in delivery of a timeline document and the presentation of a case study investigation of a current game using AI.

The case study could concentrate on items such as, player perception, non-player character's role, types of AI thought to be implemented in the game, genre specific characteristics, use of player feedback and instructions and any aspect of the game that relates to its AI components. If working in a team the case study should be of sufficient depth to allow input from each team member. The case study could be presented in many formats ranging from traditional documents to electronic presentations, web documents, video presentations and any other suitable method chosen by the candidates.

The timeline document should be a simple account of key historical events in the use of AI in games. The timeline can be presented online in electronic format where each team member can contribute. The ability to add images and links can make the timeline more interactive and visually appealing.

The actual distribution of time between Outcomes is at the discretion of the centre. However, the following distribution and order is suggested.

Outcome 1	12 hours
Outcome 2	14 hours
Outcome 3	14 hours

National Unit specification: support notes (cont)

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Guidance on approaches to assessment for this Unit

Outcome 1

The tutor can present a problem scenario which has more than one possible solution. Candidates should be observed on how they tackle the problem and should not be assessed on the effectiveness of the solution. This Outcome can be assessed using an observation checklist and/or video footage. The activity in itself, should also generate evidence to demonstrate that the candidate has achieved this Outcome To assist with self-evaluation, each candidate could be given a specific pro-forma. This Outcome could be assessed within a team activity, but each candidate should demonstrate their ability to solve a problem. The tutor could use a turn based system or use an activity that necessitates all candidates to fully participate. The evidence the candidate will collect during this task can take many forms, depending on the nature of the task. Evidence could include a collection of written materials, calculations, sketches, blogs, video, discussion forums and any other suitable format to demonstrate the problem solving process.

Outcome 2

Assessed under controlled, supervised conditions using questions in a closed-book test. Questions can be a set of 10 short answer questions. Candidates should be given remediation opportunities by completing an alternative set of questions.

Outcome 3

Assessed by a case study and a timeline. This Outcome could be delivered in teams where individual work is collated into a team presentation thus providing a fuller, more comprehensive timeline.

Opportunities for the use of e-assessment

E-assessment may be appropriate for some assessments in this Unit. By e-assessment we mean assessment which is supported by Information and Communication Technology (ICT), such as e-testing or the use of e-portfolios or e-checklists. Centres which wish to use e-assessment must ensure that the national standard is applied to all candidate evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. Further advice is available in *SQA Guidelines on Online Assessment for Further Education (AA1641, March 2003), SQA Guidelines on e-assessment for Schools (BD2625, June 2005)*.

National Unit specification: support notes (cont)

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Opportunities for developing Core Skills

Candidates will have the opportunity to develop aspects of the Core Skill *Problem Solving* during Outcome 1.

Candidates will have the opportunity to develop aspects of the Core Skills *Information Technology, Communication and Working with Others* during Outcome 3 when preparing and presenting the case studies.

Disabled candidates and/or those with additional support needs

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering whether any reasonable adjustments may be required. Further advice can be found on our website **www.sqa.org.uk/assessmentarrangements**

History of changes to Unit

Version	Description of change	Date