



Higher National Unit Specification

General information

Unit title: Physical Computing for Artists and Designers
(SCQF level 8)

Unit code: HM03 35

Superclass: CB

Publication date: September 2017

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Version: 2

Unit purpose

This unit should provide learners with an opportunity to develop an understanding of physical computing in the context of developing creative art and design project work. This unit is designed to be a practical demonstration of physical computing within the context of art and design where the learner will, as part of this process, develop research and analytical skills within a chosen vocational area.

Outcomes

On successful completion of the unit the learner will be able to:

- 1 Identify and evaluate the practice of physical computing.
- 2 Develop art and/or design work to a physical computing brief.
- 3 Produce finished art and/or design work to a physical computing brief.

Credit points and level

1 Higher National Unit credit at SCQF level 8: (8 SCQF credit points at SCQF level 8)

Higher National Unit specification: General information (cont)

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Recommended entry to the unit

Access to this unit is at the discretion of the centre. However, it would be beneficial if learners were proficient in the use of a computer, art and design project work and art and design contextual studies. This may be evidenced by the possession of relevant National units such as *Art and Design Project*, *Art and Design Context*, *Theories for Computer Arts and Design*, *Technologies for Computer Arts and Design*, or by prior experience, *Higher Art and Design* and/or *Craft Design and Technology*. It is also recommended that learners have either completed or are currently undertaking HN Unit, Digital Imaging if completing this unit as part of the Group Award Computer Arts and Design.

Core Skills

Achievement of this Unit gives automatic certification of the following:

Complete Core Skill Problem Solving at SCQF level 6

Core Skill component Providing/Creating Information at SCQF level 6

There are also opportunities to develop aspects of Core Skills which are highlighted in the support notes of the unit specification.

Context for delivery

If this Unit is delivered as part of a group award, it is recommended that it should be taught and assessed within the subject area of the group award to which it contributes.

The Assessment Support Pack (ASP) for this unit provides assessment and marking guidelines that exemplify the national standard for achievement. It is a valid, reliable and practicable assessment. Centres wishing to develop their own assessments should refer to the ASP to ensure a comparable standard. A list of existing ASPs is available to download from SQA's website (<http://www.sqa.org.uk/sqa/46233.2769.html>).

Equality and inclusion

This unit specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence.

Further advice can be found on our website www.sqa.org.uk/assessmentarrangements.

Higher National Unit Specification: Statement of standards

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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.

Where evidence for outcomes is assessed on a sample basis, the whole of the content listed in the knowledge and/or skills section must be taught and available for assessment. Learners should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Outcome 1

Identify and evaluate the practice of physical computing.

Knowledge and/or skills

- ◆ Contemporary and historical practices
- ◆ Hardware for physical computing
- ◆ Software for physical computing
- ◆ Art and design context
- ◆ Research practices

Outcome 2

Develop art and/or design work to a physical computing brief.

Knowledge and/or skills

- ◆ Physical computing practices
- ◆ Project research
- ◆ Project development
- ◆ Working to a brief

Outcome 3

Produce finished art and/or design work to a physical computing brief.

Knowledge and/or skills

- ◆ Physical computing practices
- ◆ Project development
- ◆ Project presentation

Higher National Unit specification: Statement of standards (cont)

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Evidence requirements for this unit

Learners will need to provide evidence to demonstrate their knowledge and/or skills across all outcomes by showing that they can:

Outcome 1

- ◆ investigate and evaluate physical computing in relation to contemporary practice, historical and art/design context.
- ◆ investigate and evaluate the types of hardware and software used in physical computing.
- ◆ assemble a written and illustrative research portfolio for each of the knowledge and/or skills, including explanatory notes.

Work produced outwith controlled conditions must be subject to authentication by the tutor.

Outcome 2

- ◆ apply an understanding of physical computing to an art and or design project.
- ◆ assemble written and illustrative research for an art and or design brief.
- ◆ develop a range of ideas and solutions for an art and design brief.

Outcome 3

- ◆ apply an understanding of physical computing to the development of a finished art and or design project.
- ◆ develop finished ideas and solutions to a finished art and or design project.
- ◆ present a finished art and/or design project.



Higher National Unit Support Notes

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Unit support notes are offered as guidance and 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

The purpose of this unit is to provide learners with an introductory knowledge of the practice of physical computing as an art and or design discipline. The unit should provide them with the opportunity to develop an understanding of how the development of cheap and easy to use micro processing boards have made simple electronics accessible. By using ideas from electronics and computing, artists and designers are creating physically interactive objects and environments in a range of disciplines. These include fine art, fashion, product design, architecture and communication design. Each of these disciplines finds connections between the physical and virtual worlds.

In addition to a contextual understanding, learners will need to develop an understanding of some of the basic hardware involved in physical computing. This would include microcontrollers, sensors and motors as well as output devices such as lights, speakers and almost any movable object. The learners would also be expected to gain an introductory knowledge of the software used in physical computing. This would also involve developing some very basic programming knowledge.

All of the above knowledge should then be used to develop an art and or design project that demonstrates and understanding of the practice of physical computing.

Guidance on approaches to delivery of this unit

This unit has been developed as part of the Computer Arts and Design award and is designed to be delivered within the context of a creative and visual discipline. There is a range of theoretical and technical knowledge that should be presented to the learner, which should then be applied to the design, and development of a creative project. A project brief could be either self-initiated or given to the learners. The learners would then be expected to demonstrate their understanding of both the technical demands and the practice of Physical Computing through annotated and illustrative sketchbook evidence. This will underpin the subsequent design and development process for the given or self-initiated brief.

Higher National Unit Support Notes (cont)

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This unit could be delivered independently, however, there are a range of units within the Computer Art and Design Framework, which could be supported by an understanding of cybernetic theory. These could include, *Contemporary Art Practice: Digital Media Development*, *Contemporary Art Practice: Digital Media Production*, *Cybernetics for Artists and Designers*, *Art and Design: Interactive Media*. Such an approach would create an excellent holistic model of delivery.

Guidance on approaches to assessment of this unit

Evidence can be generated using different types of assessment. The following are suggestions only. There may be other methods that would be more suitable to learners.

Centres are reminded that prior verification of centre-devised assessments would help to ensure that the national standard is being met. Where learners experience a range of assessment methods, this helps them to develop different skills that should be transferable to work or further and higher education.

This is a practical unit and assessment evidence should be gathered within the context of a practical art and design project.

Assessment guidelines

Outcome 1

Learners should demonstrate that they have a clear understanding of both the technical issues and the practice of physical computing. In addition, there should also be evidence of contextualisation within historical and contemporary practices in art and design. The learner should demonstrate that they have developed research and analytical skills that relate to the content of the unit. Evidence would be primarily gathered in a sketchbook used as part of an art and design project.

Outcome 2

Learners should demonstrate that they have understood the ideas and issues associated with physical computing within the context of developing an art and or design project. There should be evidence of project research and the development of different ideas and solutions. Evidence would be primarily gathered using a sketchbook and other art and design development practices.

Outcome 3

Learners should demonstrate that they have understood the ideas and issues associated with physical computing within the context of developing and presenting a finished art and or design project. Assessment should be made through product evidence and the learner's ability to orally present their idea. The learner will need to evaluate their project in terms of cybernetic theories and ideas. This could either be evidenced orally or a written document.

Higher National Unit Support Notes (cont)

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Opportunities for 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 social software. Centres which wish to use e-assessment must ensure that the national standard is applied to all learner evidence and that conditions of assessment as specified in the evidence requirements are met, regardless of the mode of gathering evidence. The most up-to-date guidance on the use of e-assessment to support SQA's qualifications is available at www.sqa.org.uk/e-assessment.

Opportunities for developing Core and other essential skills

This Unit has the Core Skill of Problem Solving embedded in it, so when learners achieve this Unit their Core Skills profile will be updated to show that they have achieved Problem Solving at SCQF Level 6

Applying theoretical knowledge and producing a finished art and design product to a given brief will develop creative problem-solving skills to an advanced level. There are opportunities to consider integration with work across the award. Evaluation which examines all stages of the design in context would be on-going and learners could benefit from group and individual discussion to reinforce critical judgement. Learners will also have the opportunity to develop critical thinking and evaluation skills as the place the context of knowledge within the development of a practical project.

This unit has the Providing/Creating Information component of Information and Communication Technology embedded in it. This means that when learners achieve the unit, their Core Skills profile will also be updated to show they have achieved Providing/Creating Information at SCQF level 6.

Learners will develop skills in the use of *Information and Communication Technology (ICT)* as they apply theoretical knowledge within a selected Art and or Design discipline. Formative activities should allow learners to analyse in detail relevant issues affecting the production of a product or artefact. They should be made aware of the range of tools and media available in the creation and implementation of design solutions. Learners should be advised on the effective and responsible use of equipment and software applications, and learn methods for keeping all research data secure and well organised. They should be aware of the importance of saving and performing backups and of the need to develop efficient systems for recording, coding and storing notes and drafts of design work.

History of changes to unit

Version	Description of change	Date
2	Core Skill Problem Solving at SCQF level 6 embedded. Core Skills Component Providing/Creating Information at SCQF level 6 embedded.	19/09/17

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General information for learners

Unit title: Physical Computing for Artists and Designers (SCQF level 8)

This section will help you decide whether this is the unit for you by explaining what the Unit is about, what you should know or be able to do before you start, what you will need to do during the Unit and opportunities for further learning and employment.

The purpose of this unit is to provide you with an introductory knowledge of the practice of physical computing as an art and or design discipline. The unit should provide them with the opportunity to develop an understanding of how the development of cheap and easy to use microprocessing boards have made simple electronics available. By using ideas from electronics and computing artists and designers are creating physically interactive objects and environments in a range of disciplines including fine art, fashion, product design, architecture and communication design. It is about finding the connection between the physical and virtual worlds.

In addition to a contextual understanding, you will need to develop an understanding of some of the basic hardware involved in physical computing. This would include microcontrollers, sensors, motors as well as output devices such as lights, speakers and almost any movable object. The learners would also be expected to gain an introductory knowledge of the software used in physical computing. This would also involve developing some very basic programming knowledge.

All of the above ideas and theories relating to physical computing will be placed in the context of a practical art and design project. You will work to an art and design project brief that demonstrates your understanding of the application of physical computing. This process will include developing both research and sketchbook solutions for the brief. You will be expected to present your finished project.

This unit has the Core Skill of Problem Solving embedded in it, so when you achieve this unit your Core Skills profile will be updated to show that you have achieved Problem Solving at SCQF Level 6.

This unit also has the Providing/Creating Information component of Information and Communication Technology embedded in it. This means that when you achieve the unit, your Core Skills profile will also be updated to show you have achieved Providing/Creating Information at SCQF level 6.