Unit 7: Mobile Apps Development

Level: **3**

Unit type: **Internal**

Guided learning hours: **60**

Unit in brief

Learners investigate mobile apps and design and develop an application intended for use on mobile devices.

Unit introduction

Millions of people carry a mobile device that rivals the capability of many desktop computers. These devices offer a broad range of functionality by bringing together many different technologies. To develop high-quality mobile apps you must have an understanding of how they are designed to run specifically on mobile devices and how you can exploit the technologies currently available to ensure an effective final product.

In this unit you will investigate mobile apps, how they are used, why they are created, the differences between devices and the implications of creating and using software on mobile devices. You will study the design considerations inherent in mobile apps and general software design. You will design, develop, test and review a mobile app to fulfil a specific set of client requirements.

With over a million apps on both Apple App Store™ and Google Play Store™, and the growing popularity of Microsoft Windows® mobile devices, the mobile app development industry is highly competitive and continually expanding. Many organisations use mobile apps to support their operations in one way or another. Mobile app development is an important skill for software developers who wish to retain their competitive edge. This unit will help you to progress to an app development role and gives you a basis for further study of the design and development of mobile apps and services.

Learning aims

In this unit you will:

A Investigate mobile apps and mobile devices

B Design a mobile app that utilises device functions

C Develop a mobile app that utilises device functions.

Summary of unit

Learning aim	Key content areas	Recommended assessment approach
A Investigate mobile apps and mobile devices	**A1** Types of mobile apps **A2** Context of mobile apps **A3** Mobile device integration **A4** Mobile app programming	A report evaluating bespoke mobile apps running on different mobile devices. An analysis of mobile device functions and the context in which mobile apps are used.
B Design a mobile app that utilises device functions	**B1** Requirements for an app **B2** Designing a mobile app	Analysis, design and development of a mobile app. An analysis of context. Product design documents. A log of the development process, annotated code, screenshots of running app or demonstration of app running on a mobile device. Testing documentation, including a test log, log of errors and any resolutions made.
C Develop a mobile app that utilises device functions	**C1** Content preparation for mobile apps **C2** Developing a mobile app **C3** Testing a mobile app **C4** Lessons learned from developing a mobile app **C5** Reviewing own skills, knowledge and behaviours	

Content

Learning aim A: Investigate mobile apps and mobile devices

A1 Types of mobile apps

Understand the characteristics and implications of different types of mobile applications, including:

- native apps – those that are programmed for, and installed on, a specific mobile platform
- web apps – remote apps not required to be installed on the device, e.g. mobile web pages
- hybrid apps – cross-platform-compatible scripting that can be installed on a device.

A2 Context of mobile apps

Understand how the features, purpose and context of mobile apps impact on their design, development and use, including:

- locale, e.g. maps
- utility, e.g. file manager
- productivity, e.g. office
- immersive full screen, e.g. games
- entertainment, e.g. music players
- widgets, e.g. news ticker, quick device settings.

A3 Mobile device integration

Understand the characteristics and implications of integrating mobile app services on different mobile devices.

- Using device functions, e.g. accelerometer, global positioning system (GPS).
- User interface, e.g. small screen, touch screen.
- Operating system, e.g. Android, iOS.
- Device permissions, e.g. read phone status, network access, read contacts.

A4 Mobile app programming

Understand development options and environments for developing apps.

- Programming languages, e.g. Java®, Objective-C®.
- Programming environments, e.g. Android Studio, Xcode®.

Learning aim B: Design a mobile app that utilises device functions

B1 Analyse requirements for an app

The mobile computing requirements of an identified situation:

- device capabilities required, e.g. accelerometer, GPS
- input required, e.g. touch screen, voice, timed event
- output required, e.g. video, audio, vibration
- the user's needs, e.g. location-based services, accessibility considerations.

B2 Designing a mobile app

Producing appropriate design documentation for a mobile app to meet identified requirements.

- User requirements.
- A proposed solution:
  - description of program tasks
  - target platform(s)
  - screen layouts and navigation
  - algorithms, e.g. pseudo code, activity diagrams
  - control structures
  - data validation
  - integration of device capabilities, i.e. how, when and where device capabilities will be utilised.

- Alternative solutions.
- Details of resources and assets to be used:
  - predefined code
  - video, graphical, audio.
- Test and review schedule.
- Constraints, e.g. time, phone permissions, phone capabilities, limitation of platform.
- Legal and ethical considerations applicable to the equivalent legislation in England, Wales and Northern Ireland, e.g. privacy, security, use of content created by others.

Learning aim C: Develop a mobile app that utilises device functions

C1 Content preparation for mobile apps

- Selection and application of appropriate processing and editing techniques to prepare resources for each specific device and purpose.
- Optimisation, e.g. file size, image size, selecting/removing sections of prewritten code.
- Alternative formats for screen orientation e.g. landscape, portrait.
- File formats, i.e. compatibility.
- Compression.
- Encryption.

C2 Developing a mobile app

Producing a mobile app to meet identified requirements through the use of appropriate programming language(s), tools and/or development environments, e.g. Android Studio, Xcode.

- Programming constructs:
  - constants
  - operators; arithmetic, logical
  - reserved words, e.g. public, final
  - input and output commands
  - local variables
  - global variables
  - assignment
  - sequence
  - selection
  - iteration.
- Functions and procedures.
- Data types, e.g. char, integer, real, Boolean.
- Objects and classes.
- Event handling, e.g. forms, screen components, actions.
- Utilise device capabilities, e.g. language APIs, Android Sensor, iOS Core Motion Framework.
- Interrogate device status, e.g. location, battery life.
- Orientation of device, e.g. autodetection, force orientation mode.
- Code annotation.
- Create executable for target device.
- Quality control:
  - efficiency and performance, e.g. system resources used, accessing storage media
  - maintainability, i.e. the ease of modification and improving the app
  - portability, i.e. range of device compatibility
  - usability, i.e. ease of use, how easily the user can interact with the app.

C3 Testing a mobile app

Select and use appropriate testing methodologies to ensure the mobile app meets the identified requirements.

- Test plans and test data.
- How and what to test:
  - functionality, e.g. all utilities work as intended
  - acceptance, e.g. fitness for purpose
  - performance, e.g. stress loading
  - usability, e.g. users can complete tasks easily
  - compatibility, e.g. different model/brand of phone.
- Selecting appropriate test users.
- User feedback, i.e. response from end users regarding the app
- Analysis of user feedback:
  - collation of results
  - identification of trends, e.g. '60% of users suggested…'.
- Improving and refining the app:
  - making use of the outcomes of testing and review
  - change logs
  - versioning
  - optimising the app, e.g. exporting assets to different file formats, improving the efficiency of code, developing the user interface based on review and feedback.

C4 Lessons learned from developing a mobile app

Evaluate the effectiveness of the app that has been developed with reference to:

- the extent to which the solution met the identified requirements
- issues arising during testing and refinement
- how the final app could be improved to better meet the needs of the user and fulfil the identified client requirements
- alternative solutions that could be implemented if the task were to be repeated.

C5 Reviewing own skills, knowledge and behaviours

- Planning and recording opportunities for skills, knowledge and behaviours development, including the setting of relevant targets with timescales, and how and when feedback from others will be gathered.
- Reviewing and responding to the outcomes of own skills knowledge and behaviours development, including the use of feedback from others.
- Own behaviours and their impact on outcomes, including professionalism, etiquette, being supportive of others, timely and appropriate leadership, accountability.
- Evaluating targets set for skills, knowledge and behaviour development to obtain insights into own performance.

Assessment criteria

<table>
<tr><th>Pass</th><th>Merit</th><th>Distinction</th></tr>
<tr><td colspan="2">Learning aim A: Investigate mobile apps and mobile devices</td><td rowspan="2">A.D1 Evaluate how the effectiveness of mobile app implementation and design are affected by the intended user, current technologies and the purpose of the app.</td></tr>
<tr><td>A.P1 Explain how the purpose of a mobile app and the needs, preferences and characteristics of the user affect its design and the provided features.
A.P2 Explain the impact of current technologies on the design and implementation of mobile apps.</td><td>A.M1 Analyse how the implementation and design of mobile apps is affected by the intended user, current technologies and the purpose of the app.</td></tr>
<tr><td colspan="2">Learning aim B: Design a mobile app that utilises device functions</td><td rowspan="4">BC.D2 Evaluate the design and optimised mobile app against client requirements.
BC.D3 Demonstrate individual responsibility, creativity and effective self-management in the design, development and review of a mobile app.</td></tr>
<tr><td>B.P3 Produce designs for a mobile app to meet identified requirements.
B.P4 Review the mobile app designs with others to identify and inform refinements.</td><td>B.M2 Justify how decisions made during the design process ensure the design for the app will meet identified requirements.</td></tr>
<tr><td colspan="2">Learning aim C: Develop a mobile app that utilises device functions</td></tr>
<tr><td>C.P5 Produce a mobile app that meets the design criteria.
C.P6 Test a mobile app for functionality, usability, stability and performance.
C.P7 Review the extent to which the mobile app meets the identified requirements</td><td>C.M3 Optimise a mobile app that meets the design criteria.</td></tr>
</table>

Essential information for assignments

The recommended structure of assessment is shown in the unit summary along with suitable forms of evidence. *Section 6* gives information on setting assignments and there is further information on our website.

There is a maximum number of two summative assignments for this unit. The relationship of the learning aims and criteria is:

Learning aim A: (A.P1, A.P2, A.M1, A.D1)

Learning aims B and C: (B.P3, B.P4, C.P5, C.P6, C.P7, B.M2, C.M3, BC.D2, BC.D3)

Further information for teachers and assessors

Resource requirements

For this unit, learners must have access to:

- an integrated development environment with support for mobile development such as Android Studio, Eclipse®, Xcode® or similar
- mobile devices, such as Android phones or tablets, Apple® phones or tablets, or similar

are also required in order to enable learners to meet assessment criteria.

Essential information for assessment decisions

Learning aim A

Learners must have access to more than one mobile device configuration to allow for a full investigation and evaluation of the chosen apps, for example different versions of mobile device operating system, mobile phones or tablets.

Learners will investigate at least two different apps that have implementations on at least two different mobile platforms, for example, iOS and Android. The chosen examples must provide learners with enough scope to examine a range of current technologies and design features, and the ways in which they are implemented on different systems.

For distinction standard, learners will provide a clear and balanced evaluation of how the capabilities and constraints of different devices and platforms impact on the success of mobile phone apps implementation. Learners will provide clear examples of how they used the principles of mobile design, the requirements of the user and current technology, and how successful and/or appropriate these were to the identified situation. Learners must make comparisons between different apps and different implementations of the same app, making justified suggestions for improvements. The evidence will demonstrate high-quality written/oral communication through use of accurate and fluent technical vocabulary to support a well-structured and considered response that clearly connects chains of reasoning.

For merit standard, learners will show a clear understanding of how the context in which the app is designed to operate impacts on its design, development and use. The analysis must provide a balanced discussion as to how user needs, the tasks that are to be performed and the current technologies (including target platform and device capabilities) impact on features available in the apps and the way in which features are implemented. The report will be technically accurate and demonstrate good-quality written/oral communication.

For pass standard, learners will explain how a mobile app's design and features are affected by the task(s) that it must perform and the needs and preferences of the user. The descriptions will be supported by relevant examples of how these needs and preferences are met in at least two different mobile phone apps. Learners will explain how the technologies currently available on mobile platforms affect the ways in which an app is designed and implemented. The learner will support their explanations with examples from the identified apps. Learners will explain how apps that have implementations on two or more devices make use of technologies currently available on the target platform and how the implementations differ from each other in terms of design, use and application. The evidence may have some inaccuracies and the explanations may be unbalanced.

Learning aims B and C

Learners must have access to more than one mobile device configuration to allow for design for multiple devices and implementation of a developed app onto a mobile device. For example, different versions of mobile device operating systems, mobile phones or tablets.

Learners must develop a mobile app that is of sufficient complexity to demonstrate appropriate use of a range of technologies/functions offered by modern mobile devices.

For distinction standard, learners will draw on and show synthesis of knowledge across the learning aims to evaluate how the decisions and methodologies applied throughout the design, development, maintenance, optimisation and testing of the mobile app impacted on its effectiveness. Learners will justify their designs and provide a discussion on why alternative designs were not used.

Learners will provide a detailed evaluation of their completed app's effectiveness in comparison to alternative solutions. Their evaluation must be supported by evidence from all stages of the project to reach conclusions and suggest future developments. It will contain a systematic and accurate review of their own skills, performance and behaviours, and the impact that this had on the effectiveness of the final app.

Learners will take individual responsibility for their own work, for example identifying potential issues and resolving them, reviewing their work and making improvements, keeping their work safe and secure and showing responsible use of quoted materials. They will show creativity, for example by taking innovative approaches to problem solving and through the originality of their solution.

For merit standard, learners will apply their knowledge through the selection and application of appropriate methodologies to design, develop, maintain and test an effective, optimised mobile app to meet identified requirements. Learners will produce comprehensive designs to cover multiple devices, alternative solutions and use of device functions. Learners must make use of feedback from others to help improve and refine the designs to create a solution. They will justify decisions made when developing the design. When developing their app, learners will produce optimal code in order to implement the required device functions in the most efficient way.

Learners will gather and analyse feedback on their app in order to make improvements. They will record the changes that are made and produce subsequent versions of the app as appropriate.

Learners must optimise their apps by making use of testing and feedback throughout development to improve and refine the final solution, for example resampling and exporting assets to different file types to reduce demands on system resources, making use of additional phone features, enhancing the user interface.

Learners must provide a clear and balanced analysis of the success of their solution, giving accurate and reasoned suggestions as to how it could be improved. They will discuss alternative solutions that may be implemented if the task were to be repeated. They must consider how decisions they made during the project affected the outcomes and justify why they made these decisions.

For pass standard, learners will apply understanding through the planning and development of a mobile app to meet identified requirements. Learners will produce detailed designs for their mobile app, including user requirements, visual designs and technical documentation. Learners must show evidence that they have sought feedback on their suggested solutions and made use of this feedback to create a final design.

Learners must carry out and document a number of tests and reviews of the mobile app, including use of test users and appropriate test plans, schedules and test data, to ensure that the solution works and meets the identified criteria. They will provide evidence that different types of testing have been carried out and that important problems and errors identified have been addressed.

Learners must install the app on a target device and it must work, but there may be some performance issues and/or the implemented solution may not be as efficient or effective as it could be.

Learner swill review how the decisions they made during planning and development affected the final app, explaining to what extent it meets the initial project brief. They must consider both positive and negative aspects of the app, although their review may be unbalanced and/or superficial. Learners will make reference to the possible alternative solutions that could be implemented.

Links to other units

This unit links to:

- Unit 1: Information Technology Systems
- Unit 3: Using Social Media in Business
- Unit 4: Programming
- Unit 6: Website Development
- Unit 8: Computer Games Development.

Employer involvement

This unit would benefit from employer involvement in the form of:

- guest speakers
- technical workshops involving staff from local organisations/businesses
- contribution of design/ideas to unit assignment/scenario/case study/project materials, including own organisation/business materials as exemplars where appropriate
- feedback from staff from local organisations/businesses on plans/designs/items developed
- opportunities for observation of organisational/business application during work experience
- support from local organisation/business staff as mentors.