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Supporting Student e-Portfolios

A Physical Sciences Practice Guide

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Introduction

Historically, the term portfolio has been used to describe a collection of work, both developing and exemplar, mainly paper based, usually begun when a student and developed over a professional's lifetime, used for skill recording and display purposes, predominantly by those in the arts fields. More recently it has been taken up for use in schools and colleges, describing a more modest folder holding work from a particular project or an entire course. In professional fields the term is often used to describe a collection of material required to evidence competence for accreditation or to prepare for assessment, for instance in nursing or engineering fields.

In the early 1990s the electronic portfolio, or e-portfolio, began to emerge as an evolution of the traditional portfolio but taking advantage of the increasing availability of digital media.

Since its inception, the e-portfolio has attracted a great deal of interest from around the world where there is ready access to suitable technology. This interest continues to grow with increasing numbers of students and professionals being encouraged (or required, within the health sciences and legal fields) to produce portfolios. This is supported by a wide array of software packages designed specifically for their creation and dissemination.

However, with this rapid development of numerous e-portfolios has come a lack of a common approach, a variety of technical standards (and levels of adherence to them) and a wide diversity of terminology, which is potentially confusing for those inside and outside the field.

This guide focuses on e-portfolios in the higher education (HE) sector, principally those authored by students. The purpose of this guide is to provide a basic introduction to e-portfolios: what they are, how they are being used, potential benefits and challenges, technical implications and how they might be introduced. Particular attention is given to applications involving physical sciences students but much of the information included is interdisciplinary by its very nature.

In this rapidly developing, multinational field, this guide does not hope to cover every aspect, but it does hope to give an overall awareness of the subject and guide further investigation.

What is an e-Portfolio?

This should be but is by no means a straightforward question [Smith and Tillema 2003]. A possible definition, the one that will be used here, is that a student e-portfolio is:

an archive of material, relating to an individual, held in a digital format.

Though professionals and institutions may generate their own e-portfolios, this report focuses on *students* as the principal authors. Those for whom the e-portfolio is created will be termed the *audience*.

Just as there is no standard definition there is no standard e-portfolio. The following web sites include examples of actual student e-portfolios offering a glimpse of this diversity:

- University of Warwick
  http://www2.warwick.ac.uk/cll/skills/eportfolio/crs/examples/
- LaGuardia Community College
  http://eportfolio.lagcc.cuny.edu/basic_gallery.html
- eFolio Minnesota
  http://www.efoliominnesota.com/
- New York City College of Technology
  http://eportfolio.citytech.cuny.edu/
- St Olaf College
  http://www.stolaf.edu/depts/cis/web_portfolios.htm

Additionally, in the course of her research Helen Barrett has developed many versions of her own e-portfolio which can be viewed on her website (http://helenbarrett.com/myportfolio/versions.html#1).

e-Portfolio Contents

The main contents of an e-portfolio may be material that can be best described as

- evidence of achievement
    - direct - actual pieces of work, in full or in part, produced by the individual e.g. reports, slide presentations
    - indirect – representations of artefacts e.g. photographs of work, exam module titles and grades
- statements about the evidence
    - reasoning from the author as to why this evidence was included [Nickelson 2004]
- feedback from peers, supervisors etc. on the evidence
- other personal material pertaining to the author, for example,
    - personal details
    - statement of their professional philosophy
    - aims for the future

In North America, where e-portfolios first came to prominence, the contents tend to focus on evidence of achievement. In UK HE, e-portfolios tend to be used in the context of *personal development planning* (PDP) so a balance of material is encouraged [see **e-Portfolio Uses**].

The actual contents of an e-portfolio will depend on the:

- student
- purpose of the e-portfolio
- intended audience

Because of the nature of the medium the material does not have to be restricted to a simple linear arrangement. An e-portfolio can include links between items within it and to items beyond.

An e-portfolio can potentially hold a large volume of material in a wide variety of formats, such as text, video and audio. In fact, flexibility was a key reason for the early use of e-portfolios compared with traditional portfolios [see **Benefits**]. The actual volume of material that can be held will depend on the storage medium or if hosted externally by how much space is allotted to that author. The format of material will again depend on technical considerations, principally the e-portfolio tool in use but also in the case of large files (e.g. video) the space available.

e-Portfolio Uses

A key factor of the e-portfolio is its intended use. It has been stated many times that it is vital to establish this at an early stage since it will determine many other factors such as what goes into the e-portfolio and the choice of tool set [Corwin 2003, Heath 2002, Hudson 2004, Niguidula 2005, Nickelson 2004].

An e-portfolio is very flexible and has many possible uses, including:

- storing materials
- sharing materials with an outside audience
- aiding self analysis
- supporting academic and profession goals
- supporting external assessment

In Higher Education institutions (HEIs), e-portfolios have commonly been introduced to support PDP (see **Appendix I**). The term *personal development planning* first came into use in *Higher Education in the Learning Society* (known as the Dearing Report) issued by The National Committee of Inquiry into Higher Education (NCIHE). This defined PDP as '*a structured and supported process undertaken by an individual to reflect upon their own learning, performance and/or achievement and to plan for their personal, educational and career development'* [http://www.leeds.ac.uk/educol/ncihe/]. The Centre for Recording Achievement (CRA) have provided a useful document for determining if and how the use of an IT system, such as an e-portfolio, can support PDP in an institution [http://www.recordingachievement.org/downloads/resource-SPDP.pdf]. Several IT systems which have been developed to support PDP in HE are detailed on the CETIS website [http://www.cetis.ac.uk/members/PDPcontent]. Note: *e-PDP*, the electronic provision of PDP activities, and *e-PDR*, the electronic personal development record, are closely allied to the e-portfolio [http://www.inst.co.uk/clients/jisc/e-portfoliodef.html].

A single e-portfolio may be used for more than one purpose, either because it has been adapted by the author, or the medium through which it is presented allows alternative audiences to see a customised version of the contents [Dubinsky 2003]. Its use may be purposefully adapted over time [Carliner 2005, Heath 2002] or simply change and develop naturally [Ahn 2004] as the author's life changes; this is the hope of those who promote the use of e-portfolios as a part of an individual's lifelong learning [Billings and Kowalski 2005].

It may be more straightforward for a student to construct a number of discrete e-portfolios over time, a view postulated in *Becta's View: E-assessment and e-portfolios* [http://ferl.qia.org.uk/display.cfm?resID=13337], though some see a significant value in having all of the material in one place helping connections between items to be seen.

Although some e-portfolios are used principally as an assessment tool [Abrami and Barrett 2005, Corwin 2003, Nickelson 2004, Shorr 2005, Wickersham and Chambers 2006], it has been suggested that knowing one's e-portfolio is to be assessed will counter other potential aims of e-portfolio adoption, principally their use in supporting student learning [Dubinsky 2003]. Clearly the purpose of the e-portfolio needs to be set out from the beginning and if it is to be assessed this should be made clear along with the assessment criteria [Corbett-Perez and Dorman 1999, Lebedeva and Shilova 2005] [see **e-Portfolio Assessment**].

Types of Student e-Portfolios

It has been suggested that generally student e-portfolios fall into two main categories:

- development (or working)
    - generally containing more material in a greater range of stages of development, possibly all the material from which the author has to choose
    - focus is on the perspective or needs of the author
- presentational
    - generally containing a narrower selection of work tending towards exemplar or that fulfilling specific criteria
    - focus is on the perspective of the audience

Developmental student e-portfolios

Developmental e-portfolios may be further subdivided into

- *transitional* - those aimed at facilitating transfer of data when an individual moves
    - between institutions
    - between courses
- *learning* - those aimed at supporting the individual as they progress through self development activities and processes, such as
    - ‘reflection’
    - PDP
    - competency management
    - work placements

Presentational student e-portfolios

Also frequently referred to as *showcase*, this type is put forward in support of the author for instance in the case of

- applying for a course of study
- applying for job/work placement
- building CVs
- external assessment
- accreditation
- appraisal

e-Portfolio Assessment

Opinion is divided on whether e-portfolios should be used for assessment purposes and if so, how this should be undertaken.

Methodologies

e-Portfolios can be used for formative and summative assessment [Murphy 1997, Smith and Tillema 2003]; the former, it has been argued, has the potential to raise student self esteem whereas the latter may reduce student motivation [Barrett 2006] though it has been suggested that this negative effect may be countered if the student is allowed greater autonomy within the e-portfolio process [Wade, Abrami and Sclater 2005, Murphy 1997]. The assessment itself may be done in a manner which looks for evidence of learning gains [Nickelson 2004] or by comparing it with scoring rubrics or standards [Nickelson 2004, Wade, Abrami and Sclater 2005].

Opportunities and Benefits

Supporters of e-portfolio assessment point out that it fits with the movement away from standardised testing and towards alternative or authentic assessment [Wade, Abrami and Sclater 2005, Archer 2007, Corbett-Perez and Dorman 1999, Wheaton Shorr 2005]. This is one which allows the student to form the answer to a question (rather than methods such as multiple choice questions), providing a truer picture of the student's ability [Robins 2006].

As well as this, e-portfolio assessment may offer other benefits, such as:

- increasing student reflection [Van Sickle at al 2005]
- revealing information not made known by other assessment methods [Murphy 1997]
- making students more active and taking a greater role in assessment and their learning as a whole [Corwin 2003, Nickelson 2004, Wall et al 2006]
- giving students more ways to demonstrate their knowledge [Archer 2007]
- making longitudinal studies possible [Robins 2006]

Additionally the process may cause educators to reflect on course content and teaching methods [Nickelson 2004].

Challenges

Even those who support e-portfolio assessment acknowledge the many challenges it brings including

- authenticating work [Abrami and Barrett 2005]
- deciding what constitutes 'good' work [Parsons 1998]
- uniformity of assessment between assessors [Niguidula 2005, Van Sickle at al 2005]
- the time necessary to read and assess work [Corbett-Perez and Dorman 1999, Wade, Abrami and Sclater 2005, Van Sickle et al 2005]
- how to score evidence [Abrami and Barrett 2005, Van Sickle et al 2005]
- whether the credit awarded appears to be proportionate to the time invested [Tosh, Light, Fleming and Haywood 2005]
- whether the assessment is unduly influenced by the student's technical skills or lack thereof [Abrami and Barrett 2005]

Teachers may feel that there is a conflict between their role as an assessor and as a mentor [Tillema and Smith 2007] and knowing how much guidance they can give to a student without challenging the 'ownership' of the e-portfolio [Parsons 1998].

Although it has been emphasised how important it is to include reflection [Niguidula 2005] students have been known to object to having their reflections assessed [Tosh, Light, Fleming and Haywood 2005].

Software Options

A range of options are available which subdivide into three basic types:

In-house solution

An in-house solution has the advantage of being exactly what the institution requires and adaptable as needs change. There does need to be sufficient in-house expertise both to build and maintain the system in the long term.

Commercial software

This includes

- dedicated e-portfolio software
- generic software tools

Dedicated systems have the benefits of being relatively quick to install, offering a high degree of functionality and usually having some measure of technical support. The system may not meet all of the institution's needs but it may be possible for adjustments to be made to fit its intended purpose.

It is possible to use common generic software tools such as web editing software or file management software to build an e-portfolio system [Bobak 2004, Woodward and Nanlohy 2004]; examples can be seen on Helen Barrett's website [http://helenbarrett.com/myportfolio/versions.html#1]. The advantages of this are that such tools may already be available to the institution and the staff and students used to using them. The simplicity of the system can make it relatively easy to maintain but it may lack the impact and functionality of many of the commercial systems, be less attractive as a consequence and suffer from lower or less enthusiastic take-up.

Open source software

Such software, including the e-portfolio software produced by the *Open Source Portfolio Initiative* (OSPI), is distributed free of charge [Dubinsky 2003]. Institutions which opt for such software will have to have sufficient technical knowledge to support its use and make any necessary adaptations.

Making a choice

Factors affecting choice include:

- the purpose of the e-portfolio
- costs
- level of in-house technical expertise
- institutional traditions

For some, the choice may already be made, at least in part. For instance,

- there may be a strong bias towards products that it is perceived will work harmoniously with technology already in use
- if cost is the main issue and there is not sufficient in-house expertise, using pre-existing software tools or open-source software may be the only options

For those trying to decide which e-portfolio system to adopt, the CRA have developed a set of in-depth questions [http://www.recordingachievement.org/downloads/Getting_What_You_Want.pdf] which should enable an institution to make an informed choice. For those not in a position to make the choice it is important to understand what a system can offer so that it can be used to its best advantage.

Appendix II gives some examples of e-portfolio systems in use in the UK HE sector.

Related Paper Based Resources

Though not presently available in an electronic format, both the Royal Society of Chemistry (RSC) and the Institute of Physics (IOP) produce paper based resources entitled ‘Undergraduate Skills Record’ and ‘Designing Your Future’, respectively. Use of these documents prompt students to assess their skills, seek feedback and generate a skills profile. These resources are available to download from the RSC [www.rsc.org] and the IOP [www.iop.org].

Benefits

Potential Benefits of the e-Portfolio

Since the e-portfolio is very much an evolution of the traditional portfolio, many of the benefits arising from the construction and use of the traditional form can also justifiably be attributed to the electronic version [Strudler and Wetzel 2005], such as:

- developing learning
- supporting self-assessment
- encouraging reflection
- fostering self motivation

Academics themselves can benefit from the process of constructing their own e-portfolio in terms of their continuing professional development (CPD) and by doing so they are also uniquely prepared to help students do the same [Anderson 2005]. Indeed, it could be argued that students are unlikely to be convinced of the value of constructing an e-portfolio by those who have not engaged in the process for themselves.

Furthermore, the e-portfolio offers several benefits over the traditional portfolio [Heath 2005, Horton 2004, Chalis 2005, Abrami and Barrett 2005, Strudler and Wetzel 2005].

Potential Benefits over the Traditional Portfolio

For the Student

Storage Space

Traditional portfolios have always suffered from being bulky, and difficult to transport. An e-portfolio allows a relatively large amount of material to be stored and shared in a cost effective way, either physically on a CD or DVD, or online [Corbett-Perez and Dorman 1999, Keller 2006].

Data Types

Since they are electronic, e-portfolios can contain not just text data but material such as audio files, video files and slide presentations. Much of this is in an electronic format to start with which makes it more convenient to keep it this way rather than convert it into paper format [Heath 2002].

Supporting Student e-Portfolios

Adaptability and Flexibility

It is relatively easy for material to be added, deleted, adapted or rearranged compared with that in a traditional portfolio, so it is much more likely to be kept up to date than its paper counterpart. The material does not have to be arranged or read in a linear or hierarchical structure [Chappell and Schermerhorn 1999].

Audience access

If the e-portfolio is hosted on a web site, prospective viewers can be granted access by being given the site address and any necessary access permissions. If necessary it can also be copied relatively easily on to a CD or DVD then distributed. This also opens the way for more immediate feedback from a wider range of sources [Lorenzo and Ittleson 2005, Ahn 2004, Abrami and Barrett 2005]. The e-portfolio tool may also allow different arrangements of the material to be seen depending on the 'access' given to the audience, for instance, allowing different prospective employers to see different material or to keep some material from view.

Key Skills Development

Developing an e-portfolio gives individuals the opportunity to learn, develop and showcase key skills [Anderson 2005, Keller 2006, Abrami and Barrett 2005].

For the Employer

e-portfolios have been said to offer a more 'authentic' analysis of an individual [Carliner 2005, Heath 2002, Robins 2006] because it offers a fuller picture of their achievements than, say, exam results [see **e-Portfolio Assessment**]. Employers may be offered an individual's e-portfolio as they might have been offered a traditional portfolio during an interview.

For an Institution

Adoption of an e-portfolio programme for students offers several potential opportunities for the host institution [Nickelson 2004, Gathercoal, Love, Bryde and McKean 2002, Lorenzo and Ittleson 2005], including:

- helping with student transition
- giving an insight into student progression through a specific course or in general
- offering the opportunity for dynamic course feedback from students
- helping to support work placements
- by showcasing student achievement it can also demonstrate the success of the institution
- encouraging institutional reflection and improvement
- fulfilling PDP requirements

Challenges

Any new system, particularly one with a technological basis, offers its own challenges. These can be subdivided as follows:

- technical
- resource
- legal and ethical
- personal

Technical Challenges

e-Portfolio Tool Set

Whatever system is chosen it has to meet the needs of the users and be sufficiently straightforward for beginners and yet be sufficiently flexible for the more advanced [Tosh, Light, Fleming and Hayward 2005, Carliner 2005, Barrett and Knezek 2003].

It has been pointed out that there are a growing number of people, sometimes referred to as ‘digital natives’, many of whom already have a ‘digital presence’, that is a representation of various aspects of themselves on the web using a variety of tools such as blogs, social bookmarking, web based social networking, wikis or their own dedicated web site. The effect of this could be that:

- authors may have a considerable amount of IT experience and find the e-portfolio tool they are presented with to be unsatisfactory by comparison to the tools they are already using
- authors may feel that they have already spend a considerable amount of time and effort using other tools and may not feel that they wish to use the e-portfolio tool they are being offered to ‘start from scratch’

IT Support

The amount of support needed for both institution staff and students should not be underestimated particularly when the system is first introduced [Wickersham and Chambers 2006]. Staff and students will need training and to know that they can obtain assistance when needed [Hudson 2004]. If students are offered the opportunity to keep their e-portfolio at their former institution the implications for continued technical assistance in the future needs to be considered. For the institution, it is also important to consider the implications of system ‘downtime’ and how this will be managed.

Interoperability and Standards

With the increase in popularity of e-portfolios, key areas of interest are those of *interoperability*, which is the transfer of data from one system to another whilst maintaining its integrity, and *standards* [http://www.jisc.ac.uk/media/documents/publications/e-portfolio-overview-v1-05-final_web.pdf]. These issues are of particular importance when the e-portfolio is to be used to assist transition and for those supporting the use of e-portfolios to aid lifelong learning, where ideally individuals would be able to start their e-portfolio at any stage in their lives and always be able to take it with them.

Access

Although the e-portfolio offers clear advantages over the traditional portfolio when it comes to allowing access this brings corresponding challenges, for instance:

- deciding who has permission to access the e-portfolio and who sets those permissions
- providing all students with appropriate access to their e-portfolio [Welzer and Strudler 2005]
    - when they are at the host institution
    - when on work placement
    - when they leave to enter another institution or the workplace
- deciding how long the institution will host and allow access to the e-portfolio after a student has left and if there will be a charge for this facility
- maintaining the security of the information in the e-portfolio

It is worth bearing in mind the consequences of what might be considered trivial matters (such as having to go through more than one login screen to reach the e-portfolio system) on the individuals concerned, especially those who may already be dealing with other issues; e.g. finding the technology or time demands a challenge.

Resource Challenges

People

The most important resource will be the people involved:

- academic staff to introduce and support the process, including providing prompt feedback to students and guidance in reflection which may be unfamiliar or problematic for some [Darling 2001]
- technical staff to support the system
- support emanating from the top levels of the organisation

Supporting Student e-Portfolios

Time

Time is often cited as an important consideration when implementing an e-portfolio system [Bobak 2004, Corbett-Perez and Dorman 1999, Heath 2005]. Nevertheless, time invested in supporting students can yield more independent learners which will benefit the institution in the long term. In the case of student e-portfolios, planning needs to be done to analyse the time demands of:

- training staff and students
- introducing the e-portfolio project
- providing technical and academic support
- giving feedback to students

and also how this may impact upon the curriculum.

All authors, whether students or professional, will need to be aware of the significant amount of time it may take to construct their e-portfolio and keep it up to date, especially in the early stages, but that this will become less of an issue as their confidence and proficiency increases.

Costs

For the institution, it is worth noting that costs include those for:

- the software and hardware, its installation, maintenance and repair
- possible additional storage as the size of e-portfolios and their number increase
- training for existing staff or employing and training new staff

Legal and Ethical Challenges

The main areas to consider are those of:

- data protection
- intellectual property rights
- accessibility

Data Protection

The **Data Protection Act 1998** (DPA 1998) seeks to establish the responsibilities of those who determine the gathering and processing of personal information and the rights of those who are the subject of that information.

For certain types of e-portfolio system, the institution does not exercise any *control* over the data gathering or its use, is therefore not subject to the Act. In all other cases the institution must inform the Information Commissioner's Office (ICO) of this

and indicate the purpose(s) for which it intends to process personal information and the intended operational uses of the e-portfolio system [Charlesworth and Home 2004, Charlesworth and Home 2005].

Intellectual Property Rights

Intellectual Property (IP) Law seeks to protect works of human creativity and the rights of the creators and owners, whilst allowing public access. The main area of IP law in this context is copyright.

Copyright is governed by the **Copyright, Designs and Patents Act 1988** (CDPA 1988) and ownership is generally held by the person who created the work. If the student is sponsored there may also be the question of joint ownership. Institutions need to be fully aware of who owns the copyright on student work, as do students themselves. Awareness is paramount in avoiding problems in instances such as when students include the work of colleagues or information from work placements in their own e-portfolios [Charlesworth and Home 2004].

Disability Legislation

Though technology may increase opportunity for many it is important for institutions to be aware of the potential challenges e-portfolio systems may present for some individuals. The **Special Educational Needs and Disability Act 2001** (SENDA 2001) requires institutions to take reasonable measures to ensure disabled students are not placed at a disadvantage and make reasonable adjustments where possible [Charlesworth and Home 2004]. Institutions should also be aware of their responsibilities to their disabled employees under the terms of the **Disability Discrimination Act 1995** (DDA 1995).

Other Legal and Ethical Issues

Institutions will be well advised to consider the implications of student e-portfolios containing material that might bring charges such as plagiarism or defamation when published, or leave authors open to the possibility of 'identity theft' [McFadden and Saiki 2005].

Briefing papers on the topic of student plagiarism, its avoidance and detection, have been produced both by the HEA Physical Sciences Centre [www.heacademy.ac.uk/assets/ps/documents/briefing_papers/ps0005_plagarism_feb_2005.pdf] and JISC [www.jisc.ac.uk/uploaded_documents/JISC-BP-Plagiarism-v1-final.pdf]. JISC also fund the JISC Plagiarism Advisory Service (JISC PAS) for academics and students.

Supporting Student e-Portfolios

In the case of student e-portfolios, clear guidelines on content should be worked out as soon as possible along with suitable policy on the action to be taken if rules are breached.

Further Information

- Acts of Parliament can be viewed in full online and print copies obtained from the Office of Public Sector Information (www.opsi.gov.uk)
- A clear overview of the DPA 1998 can be found in the Data Protection FactSheet: What is the Data Protection Act (DPA)? produced by the ICO (www.ico.gov.uk)
- JISC Legal Information Service has commissioned a number of useful legal studies relating directly to e-portfolios which can be obtained from their website (www.jisclegal.ac.uk)
- JISC Plagiarism Advisory Service (JISC PAS) (www.jiscpas.ac.uk)

Personal Challenges

A highly significant feature of any system is of course the people within it. All will come with their own attitude towards new technology and this can work both for and against e-portfolios. Some have found that the 'e' nature of the tool actually inspires and encourages people to engage with it [Lebedeva and Shilova 2005]; on the other hand, negative past experience with technology or a feeling of insufficient previous experience can work against it. Level of initial technological expertise and access to technology cannot be assumed. This is equally true for both those who are building their e-portfolio and those involved in supporting them within the institution.

For some, attitudes towards e-portfolios or the PDP/CPD framework in which they are placed within the institution or profession can determine where or not an individual wishes to engage with the process.

Positive support and encouragement from an institution, professional body or peers can do much to aid success [Lippert 2004, Woodward and Nanlohy 2004] but likewise it is difficult for a venture to succeed when those involved are already 'convinced' of its likelihood to fail. It is generally agreed that the way the project is initially introduced has a significant impact on how the project is accepted [Jorgensen and Hansen 2004]. This is why thorough preparation before the e-portfolio is launched is so important.

Successful Introduction of e-Portfolios

Choosing an e-portfolio tool may not be a decision that any staff member has to make since the choice may have already been made at institution level. For those who do have to make this choice, fortunately there is a wealth of material available on the experiences HEIs have had with different e-portfolio systems and their implementation.

Once a system is chosen, sources [Gathercoal, Love, Bryde and McKean (2002), Chappell, Schermerhorn 1999, Butler 2006] indicate many common recommendations which assist the successful implementation of an e-portfolio system:

- implementation and integration needs to be broken down into smaller projects which can be built upon
- from the outset it should be understood that this is a long term undertaking
- implementation will need support from above and 'champions' should be involved from the beginning
- the purpose of the e-portfolio needs to be clearly identified and integrated into the curriculum
- the programme may need to be mandatory at least in part or at the beginning to overcome initial resistance
- staff need:
    - to be shown the possible positive outcomes to the venture and examples of best practice
    - to see this as being in the interests of the student
    - support and training to acquire the appropriate skills to support students including technical skills and giving feedback
    - to go through the process of creating an e-portfolio themselves
- students need:
    - clear reasons to get involved
    - support and training to acquire appropriate skills and not be able to opt-out due to lack of skills
    - to be given advice on choosing artefacts
    - to be taught how to reflect
    - encouragement and regular feedback
    - to see good examples
    - to know if and how the e-portfolio will be assessed

Further Information

Further information about the implementation of e-portfolios, e-portfolio projects and case studies are available from the following organisations:

- CRA [http://www.recordingachievement.org]
- JISC [http://www.jisc.ac.uk]
- European Institute for E-Learning [http://www.eife-l.org]
- SURF [http://www.surf.nl]

Examples of e-Portfolios in Use in UK HEIs

The following extracts are taken from some of the responses to a survey asking for examples of e-portfolio use, particularly in HE science departments. Note these are individual viewpoints and may not represent practice across a whole institution.

University of Gloucestershire

PebblePad (a commercial product) is being used by all first year students studying in the Department for Natural and Social Sciences (except Sociology and Psychology - planned to change in 2008). The e-portfolio is being used as a study reflection tool and to build CVs with its main aim to enable students to reflect on learning through sustainability and to build an ongoing and active CV. Integrated into the course it is supported by Personal Tutors. Its use is compulsory and this receives credit.

University of Kent at Canterbury

Currently students are directed towards the Keynote website but the university is also piloting *PebblePad* which it may use in the future. In Physical Sciences all new students are told about personal development planning and the e-portfolio tool is recommended to students with its main aim to support PDP. This is introduced in a Stage 1 Skills module and its use is supported through an introduction by lecturers. Use is not compulsory and does not receive credit.

Kingston University

All level 1 students in the School of Pharmacy and Chemistry are offered the means and support to create an '*electronic personal development portfolio (e-pdp)*' using the *Portfolio* tool on *Blackboard*, as an opportunity to document, reflect on and assess their growth during their time at university. Students may create a portfolio and upload files with activities written by the *e-pdp* leader in collaboration with staff. The e-portfolio is offered to all but is not compulsory. Currently, the use of *e-pdp* does not receive credit, although this is under review.

Liverpool John Moores University

It is planned to make available the *Portfolio* tool on *Blackboard* across the entire University from September 2007, with its main aim being to promote reflection and enable students to gather evidence. In the School of Pharmacy and Chemistry it will be associated with a Level 1 key skills module, currently supported by tutorials in the first semester. Its use will receive credit in so much as it is part of a credit bearing module.

Supporting Student e-Portfolios

Loughborough University

Loughborough's electronic PDP tool *RAPID* is used with Science and Engineering Foundations Studies (SEFS) students. This is part of the Learning and Communication Skills module with 30% of the marks given to a portfolio.

Newcastle University

ePET portfolio is being used with postgraduate students in all faculties. The main aims of its use are promoting generic and transferable skills and supporting postgraduate training programmes and it is supported through training at induction. Use of the e-portfolio is integrated with the postgraduate training programme. Its use is soon to be made compulsory and although its use does not receive credit it will be supporting postgraduate annual progression.

Northumbria University

The *Portfolio* tool on *Blackboard* is being used by first year students from BSc (Hons) Business Information Systems, BSc (Hons) Business Information Technology, and Foundation degree students within the School of Computing, Engineering and Information Sciences. In addition, the students in the first two cohorts continue their portfolio into their second year as part of their 'Employability' portfolio. The e-portfolio tool is used to hold and showcase a range of documentation covering personal development issues and reflections, together with evidence gleaned from their studies and working practices. Its main use is seen as holding material to chart student progress and achievements, but ultimately it may facilitate reflection. It is fully integrated as a part of the course modules. First year students have workshops to show them how the tool works and some media tools are being developed for use through the VLE. Its use is compulsory and as the e-portfolio is assessed as part of the modules, it does receive credit.

University of Paisley

First year students in science & engineering use *Blackboard* to produce an e-portfolio consisting of various files they have created. One of the items included is a pdp. The main aim of e-portfolio use is believed to be to help students think about their skills development. It is integrated into the course, supported through a worksheet with instructions and timetabled sessions with tutors. Its use is compulsory and it does receive credit.

University of St Andrews

The e-portfolio tool within *WebCT/Blackboard* is being piloted currently with level three students in physics and astronomy, moving to many first year students in the coming session. The main aims are developing student understanding of what they are doing, what they could be doing, and why they may wish to be doing it, alongside recording achievement for later use. Integrated into the course students are supported through large and small group tutorials. Its use is compulsory and the current version in physics does receive a small amount of credit.

University of Ulster

The University of Ulster has a PDS (Personal Development System) which includes an e-portfolio. The e-portfolio tool is there to allow the student to track their work through the University and is expected to contain CV, placement reports and elements from each of their modules. It may also be used for recording the outcome of student consultations with their studies advisers. It is integrated it into all courses and each School has a PDS co-ordinator. All students get an introduction to the system at the start of their University career and at subsequent times when they are required to use it. Though all students including postgraduates are expected to use it, use is not compulsory and does not receive any credit.

University of Wolverhampton

The *PebblePad* e-Portfolio system is used by students, principally first year and second year undergraduates, across the following subject groups: Biomedical Science, Environmental Science, Biological Sciences, Pharmacy, Physiology and Clinical Physiology. Some use is made by Postgraduate students. The main aim of e-portfolio use is to support students in three main areas of learning namely: PDP, learning and teaching and CPD, providing both status and structure for the processes of reflection and personal development. Use is both stand alone and integrated into the curriculum. Students are supported within modules by teaching staff and outside of teaching sessions by a small group of lecturers (championing the use of e-portfolios) and a dedicated team of demonstrators. On-line support is available through the *PebblePad* website. There is a blend of compulsory use and non-compulsory use for PDP. When linked to summative assessment credit is associated with the use of the e-portfolio. PDP activities are invariably not directly linked to credit.

Glossary of Terminology

continuing professional development (CPD)	The acquisition of knowledge and skills relating to professional practice.
e-PDP	Electronic provision of personal development planning (PDP) activities. Has also on occasion been used synonymously with the term *e-portfolio*.
e-PDR	Electronic personal development record (PDR).
e-portfolio	An archive of material, relating to an individual, held in a digital format. Synonyms include *eportfolio*, *ePortfolio*, *efolio*, *electronic portfolio*, *electronic folio* and *digital portfolio*. W*eb portfolio* and *webfolio* are sometimes used synonymously for e-portfolio but are sometimes used to describe an e-portfolio where all or a significant portion of the content is hosted on the web or else a static website.
evidence	Material to support a claim of a skill or competence. May take many forms including artefacts such as reports and presentations, or testimonials.
interoperability	This is the ability of two or more systems or components to exchange information and to use the information that has been exchanged [Institute of Electrical and Electronics Engineers. *IEEE Standard Computer Dictionary: A Compilation of IEEE Standard Computer Glossaries.* New York, NY: 1990.].
lifelong learning	All activities undertaken at any age and in any setting, to further skills or increase knowledge
open source	When applied to software, that which has its source code made available to the general public for use with or without modification, with either restricted or no intellectual property restrictions.

personal development planning (PDP)	'…a structured and supported process undertaken by an individual to reflect upon their own learning, performance and/or achievement and to plan for their personal, educational and career development'. *Higher Education in the Learning Society* (known as the Dearing Report) issued by The National Committee of Inquiry into Higher Education (NCIHE) [http://www.leeds.ac.uk/educol/ncihe/].
personal development record (PDR)	Output of the personal development planning process
social bookmarking	This is based on storing and sharing internet *bookmarks* (pointers to websites) via a web based service. Can also incorporate other aspects such as blogging and *social networking*. Examples include del.icio.us [http://del.icio.us/] and Digg [http://www.digg.com/].
social networking (web based)	Using the internet to create a virtual community. Include web sites where users establish personal profiles and links to other members. Examples include MySpace (www.myspace.com), Facebook (www.facebook.com) and Orkut (www.orkut.com).

Glossary of Acronyms

Becta	British Education Communications and Technology Agency
CDPA 1998	Copyright, Design and Patents Act 1988
CETIS	Centre for Educational Technology Interoperability Standards
CPD	continuing professional development
CRA	Centre for Recording Achievement
DDA 1995	Disability Discrimination Act 1995
DPA 1998	Data Protection Act 1998
DfES	Department for Education and Skills
e-GIF	e-Government Interoperability Framework
HEFCE	Higher Education Funding Council for England
HEI	Higher Education institute
ICO	Information Commissioner's Office
IMS	IMS Global Learning Consortium Inc.
IP	intellectual property
JISC	Joint Information Systems Committee
OSPI	Open Source Portfolio Initiative
PDP	personal development planning
PDR	Personal Development Record
QAA	Quality Assurance Agency
QCA	Qualifications and Curriculum Authority
SCoP	Standing Conference of Principals Ltd
SENDA 2001	Special Educational Needs and Disability Act 2001
UCAS	Universities and Colleges Admissions Service
UUK	Universities UK

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Appendix I: The e-Portfolio in UK Higher Education

- 1997 The National Committee of Inquiry into Higher Education (NCIHE) issue *Higher Education in the Learning Society* (known as the Dearing Report) [www.leeds.ac.uk/educol/ncihe/]. This included a recommendation for the introduction of an HE *Progress File*, made up of a 'transcript' of a student's achievement from the institution and 'a means by which students can monitor, build and reflect upon their personal development'. The term *personal development planning* or *PDP* comes into use.
- 1998 The UK Government sponsors recording achievement projects involving the use of ICT in a series of universities.
- 2001 Universities UK (UUK), SCoP and the Quality Assurance Agency (QAA) issue *Guidelines for HE Progress Files* to support the implementation of a PDP programme across the HE sector by 2005/6 [www.qaa.ac.uk/academicinfrastructure/progressFiles/default.asp].
- 2002 *14-19: Extending Opportunities, Raising Standards* announce that the DfES *Progress File* is to be made available to UK schools and colleges [www.dfes.gov.uk/consultations/conResults.cfm?consultationId=1207].

  The Higher Education Funding Council for England (HEFCE) and the Learning and Skills Council's *Partnership for Progression* recommends development of progress files as part of its strategy for widening participation in further education (FE) and HE [www.hefce.ac.uk/pubs/hefce/2001/01_73.htm].
- 2003 The DfES launch a consultation exercise, *Towards a Unified e-Learning strategy*, to gauge opinion on this topic in all sectors of UK education and training [www.dfes.gov.uk/consultations/conResults.cfm?consultationId=774].
- 2004 *Measuring and Recording Student Achievement* (known as the Burgess Scoping Report 2004) urges UK higher education institutions (HEIs) to work towards a detailed electronic portfolio model and points out how PDP can allow students to customise information about their learning and how they present it to different audiences [bookshop.universitiesuk.ac.uk/downloads/measuringachievement.pdf].

Review of fair admissions to HE: recommendations for good practice (known as the Schwartz Report) highlight the work being done on e-portfolios and electronic transfer of student data. It recommends UCAS and other admission organisations look at accepting a wider range of information in the admissions process [www.admissions-review.org.uk/].

The Qualifications and Curriculum Authority (QCA), in their *Blueprint for e-assessment*, outlined a 5-year strategy for the national delivery of electronic assessment including the acceptance and assessment of e-portfolios by all awarding bodies [www.qca.org.uk/6877.html].

Europe's first National e-Portfolio e-Progress File is delivered to the National Assembly of Wales.

- 2005 In *Harnessing Technology: Transforming Learning and Children's Services*, the DfES encourages all institutions to offer students a 'personal online space' with the aim of all being able to develop an e-portfolio that will become part of their lifelong learning, by 2008 [www.dfes.gov.uk/publications/e-strategy/].

  In the *HEFCE Strategy for e-learning*, support for e-based systems for describing achievement and PDP is included as part of its policy on supporting students and their progression [www.hefce.ac.uk/pubs/HEFCE/2005/05_12/].

  Improving the Higher Education Applications Process from the DfES identifies the e-portfolio as potentially offering HEIs information to help inform the admissions process and to be particularly useful for students with a non traditional route into HE [www.dfes.gov.uk/consultations/conResults.cfm?consultationId=1346].

- 2006 Becta's *e-Assessment and e-portfolios* predicts that 'Within a few years, e-assessment and e-portfolios will be integral parts of modern learning and teaching' [ferl.becta.org.uk/display.cfm?resID=13337].

- 2007 DfES set to launch their national e-portfolio strategy.

Appendix II: Examples of ePortfolio Software

This constitutes a small sample of those software solutions available. A more extensive list can be found on Helen Barrett's website (http://helenbarrett.com/myportfolio/versions.html#1).

In house solutions

RAPID Progress File

- Developed by Loughborough University, this is described as a 'web-based PDP tool', which is available to other HEIs at no direct costs under a licensing arrangement
- Includes the facility to create an e-portfolio
- Web site - http://rapid.lboro.ac.uk

LUSID

- Developed by the University of Liverpool, this is described as an 'online PDP tool'
- Includes the facility to create an e-portfolio
- Web site - http://lusid.liv.ac.uk/

SiteBuilder

- Developed by e-lab, a division of the University of Warwick's IT Services, this is described as a 'web publishing tool'
- Includes the facility to create a web based e-portfolio
- Web site - http://www2.warwick.ac.uk/cll/skills/eportfolio/

Commercial Packages

PebblePad

- Developed by the University of Wolverhampton in conjunction with their spin-off company *Pebble Learning*, this is described as an 'evidence-based web-publishing system'
- Primarily designed to support the development of an e-portfolio
- Web site - http://www.pebblepad.com

Blackboard ePortfolio

- Developed by *Blackboard* and described as ‘a personal portfolio solution‘
- Primarily designed to support the development of an e-portfolio in conjunction with the corresponding virtual learning environment (VLE)
- Web site - http://www.blackboard.com/products/Academic_Suite/portfolio

Folio

- Developed by *ePortaro*™ and described as an ‘electronic portfolio software system’
- Primarily designed to support the development of an e-portfolio
- Web site - http://www.eportaro.com/

Open source Software

OSP ePortfolio

- Developed by the *Open Source Portfolio Initiative* (OSPI), a community of individuals and organisations, this is described as a ‘content management system for education’
- Primarily designed to support the development of an e-portfolio
- Web site - http://www.osportfolio.org/

‘Generic’ ePortfolio and ePortfolio Extensions Toolkit (ePET)

- Developed by the University of Newcastle, this is described as comprising ‘a *generic* ePortfolio … to which instance or subject specific tools can be added’ with ‘an emphasis on supporting Personal development Planning’
- Primarily designed to support the development of an e-portfolio
- Web sites *ePortfolio* http://www.eportfolios.ac.uk/FDTL4?pid=54
  ePET http://www.eportfolios.ac.uk/ePET

Personal ePortfolios for Teaching and Learning (PETAL)

- Managed by Oxford Brookes University’s Centre for eLearning (C4eL) and developed by a consortium, this is described as a ‘general e-portfolio tool for lifelong learning based on the Open Source Portfolio Initiative’
- Web site - http://www.brookes.ac.uk/research/odl/petal/petal_home.html

The Higher Education Academy
Physical Sciences Centre

...enhancing the student experience in chemistry, physics and astronomy within the university sector.

Physical Sciences Practice Guides are designed to provide practical advice and guidance on issues and topics related to teaching and learning in the physical sciences. Each guide focuses on a particular aspect of higher education and is written by an academic experienced in that field.

This guide focuses on e-portfolios in the higher education (HE) sector, principally those authored by students. The purpose of this guide is to provide a basic introduction to e-portfolios: what they are, how they are being used, potential benefits and challenges, technical implications and how they might be introduced. Particular attention is given to applications involving physical sciences students but much of the information included is interdisciplinary by its very nature.

In this rapidly developing, multinational field, this guide does not hope to cover every aspect, but it does hope to give an overall awareness of the subject and guide further investigation.

Tracey Madden is the Centre's Project Officer responsible for the e-portfolio project. She is a former teacher and a physicist and has recently been authoring on-line learning materials.