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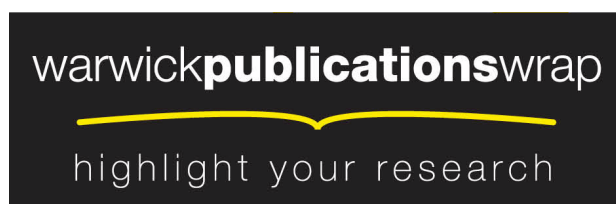
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A report on e-portfolios: design features, uses, benefits, examples & emerging trends

The context of this investigation

After an incubation period of at least fifteen years, punctuated by occasional high-level pronouncements and low-level experimentation, we are hearing teachers and administrators from across our institution saying "we think we should do e-portfolios". There is undoubtedly a convergence of new technologies, established theory (especially Schön's *Educating the Reflective Practitioner,* 1990) and socio-economic developments provoking this emerging trend, along with some useful publications (Stefani, Mason & Pegler's, 2007 book on *The Educational Potential of E-portfolios* provides a thorough, but rapidly dating, survey). However, a common mistake under such circumstances is for service providers to react by assuming that when lots of people shout "we need X now" they are all talking about the same "X", or indeed have a well worked out concept of what exactly "X" is, what it does and why anyone would want such a thing. In the *academic technology* business, with its basis in the complex and diverse world of academic practice (an overlapping assemblage of research, teaching, learning, personal development, administration and management), this error has been especially common.

This paper gives a more sophisticated response to the rapid (re)emergence of the e-portfolio buzz-word. Starting from a basic e-portfolio design pattern, a wide range of variations are explored. It would be difficult, at this stage, to examine exhaustively the benefits and drawbacks of all of the design possibilities. However we do need to go as far as possible towards establishing viable claims about types of e-portfolio and their implications. The aim is to establish a body of knowledge for guiding users and technology providers, so as to achieve an ever-more appropriate and fruitful alignment of needs, designs, platforms and informed choices. In academia, such an alignment is always hard to achieve. It seems to be ever slipping out of our grasp. This is because the people within academia who most readily embrace new approaches are also those who are most likely to reflect, learn and change their requirements as a result of engaging with innovations. This non-linearity endlessly shifts the goal posts. It is a challenging example of what Richard Buchanan called the *wicked problems of design thinking* (Buchanan, 1992). We can expect this effect to be even more pronounced in the area of e-portfolios, which as will be shown, can (and perhaps should) act to change our real and perceived needs and practices. As Mason *et al* note, e-portfolios do tend to provoke the "rethinking of curriculum design" (p.68). This effect is already being seen in the History Department, less than a year into their e-portfolio use. But we should not be put off by this. We have to do our best in developing models and guidance. And by understanding and shaping the possibilities, then giving facilitated *design agency* to end users (helping them to develop requirements and to make and implement informed design choices), we can still make a significant positive contribution.

In striving towards this ideal, the key benefits of e-portfolio approaches are discussed, with some coverage of the variations, and suggested research and development directions. Deep and persistent diversity-creating factors are highlighted. A range of mini case studies from Warwick are then examined to throw further light upon the combinations of real and perceived needs, platform affordances and design choices. Finally, this is a fast evolving field, especially given the near-ubiquitous adoption of platforms with e-portfolio-like elements (Facebook, LinkedIn etc). Technology and academic support services must look further forwards to emerging practices and requirements just at the edge of the institutional-perceptual horizon. We must be prepared to shape these potentially disruptive developments for the benefit of students, teachers, the institution and society.

But first we must seek knowledge and understanding.

1. What are *e-portfolios*?

"E-portfolio" is a pedagogical design pattern with many varying implementations. Mason, Pegler and Weller (2004) describe three purposes that e-portfolios commonly fulfil: developmental, presentational and assessment. In reality these roles are often mixed together, with implementations selecting from a wide range of design features. However, students and teachers need to be clear about purposes and how a selected set of features relate to them. The essentials of the pattern may be stated as:

> Over an extended time-span a student creates and maintains an electronic collection and presentation of resources and information about themselves and their work. That is an e-portfolio. It can focus upon one aspect of the student's activities, for example a specific module or project. Or it might cover larger scales and collections of activities (a whole degree programme, or even a whole lifetime). A wider-scoped e-portfolio might contain a collection of more specific e-portfolios.

The student is the e-portfolio owner. In their survey of definitions of "e-portfolio", Stefani *et al.* note that it is often assumed that the owner should have "absolute user-control over what is shared, with whom, for what purpose and for how long" (Stefani, Mason & Pegler, 2007: p.9). This differentiates e-portfolios from other, institutionally controlled, entities and systems. The e-portfolio is very much about the student and their experience, as a developing interaction with their studies. What they construct represents and expresses aspects of their academic work, such as academic interests, events, achievements, capabilities, plans, projects, decisions, progress, resources, academic-social networks, institutional affiliations and roles, extra-institutional associations and roles.

But the e-portfolio is more than just a scrap-book. An e-portfolio that is a "jumbled collection of photos, artefacts, unconnected ramblings" might be "fun to assemble", but will have "lost their educational value" (Stefani, Mason & Pegler, 2007: p.58). The contents are selected, recorded, organised and presented in a meaningful way over time, to be used by the student in their reflective considerations, with tutors and peers where appropriate, and as a means for presenting themselves with *greater depth and individual richness* to others (e.g. research funders, potential employers). It Is a place for constructing and telling "myriad stories to diverse audiences" (*ibid.* p.9) - audiences including the self. In this way e-portfolios may play a significant role in prompting and shaping *reflective* and *reflexive considerations*, where the student turns their attention to their own condition, history, future and characteristics (where the term "reflect" means "to pause and think about events and entities", while the term "reflex" means "to reflect about oneself").

DiBiase *et al.* (2002: p.8) describe a pedagogical pattern that integrates e-portfolio creation with *personal development planning* (PDP):

- Collection of materials.
- Selection of materials.
- Reflection.
- Projection (considering where they might develop in the future, goals and measures).
- Presentation.

The e-portfolio approach may support many variations on this theme and other patterns of this kind. These processes require types of cognitive-communicative-technical actions including:

- Selectively recording events and information.
- Editing & organising.
- Adding additional commentary about the things recorded.
- Sharing all or some of the e-portfolio with specified others or unspecified audiences.
- Using the contents of the e-portfolio for decision making, reflective considerations, as evidence, as a resource for academic work etc.
- Recording decision making and reflective considerations.
- Meta-reflective considerations of the approaches used for decision making and reflective considerations.

The organisation of these actions and the e-portfolio that is produced may be more or less pre-structured and automatically prompted. For example, when a specified kind of event occurs (e.g. six weeks before an essay deadline), the student might be prompted to write a reflective account of the process through which they chose their essay title (perhaps following a series of questions). Or, when the student has achieved a result (completed an assignment, received a grade), the result might be automatically added to the e-portfolio (with official accreditation), and

the student prompted to write about it. In other cases, the student might be responsible for creating and applying their own structures. Or they could go from a more constrained starting point to a more customised and personalised result over time. This progression follows the same path to student autonomy described by the QAA as essential to the Personal Development Process at the heart of university learning:

> "something that an individual does with guidance and support which decrease as personal capability is developed so that it becomes self-sustaining" (QAA report, 2009)

The e-portfolio might be integrated into a tutorial, mentoring or peer-to-peer framework, in which people other than the owner reflect and comment upon its contents (on the things that it is about and on ways in which the owner represents and reflects upon them). In this way it can provide a safe, managed, supported home for peer assessment, helping the student to exploit the benefits of this approach. Where this happens, with students becoming interested in each others' e-portfolios, an "e-portfolio culture" may develop (Stefani, Mason & Pegler, 2007: p.66), bringing with it opportunities for collective development (but also additional social complications).

An e-portfolio platform, in which the e-portfolios of many students are hosted, can also provide functionality that makes it easy for tutors and course managers to track student activities and progress across whole groups of students, and to generate reports on specific activities of themes. For example, if all of the students are prompted to reflect upon the process they use to choose an essay topic, their responses could be collectively read and analysed, perhaps even using text analysis software to look for patterns and trends. In this way the e-portfolio system may be similar to a traditional content-transmission oriented VLE. The tutor can prompt, direct, track, audit and analyse. This may even go as far as using the e-portfolio in summative assessment. At some point, a definitive selection of content is produced and submitted, or the whole e-portfolio is frozen in time and assessed formally. It could be possible for an e-portfolio system to integrate systems for supporting assessment, easing the inevitable issues encountered when assessing a complex production (see Johnston, 2004 for an account of the challenges of assessing portfolios).

At the end of the period of study covered by the e-portfolio, the e-portfolio and its contents could remain accessible for viewing and/or editing by the owner, by automated institutional systems and by tutors. It might also be viewable by other students and external audiences. This is a matter of policy, a question of demand and usefulness, and limited by the platform in which it is hosted. The platform might also provide an export facility. The e-portfolio might be exported as a single file, for example a PDF. Or it might be exported as a package of files. There are standard schemas for organising such packages. However, the e-portfolio then needs access to a further platform into which they can import their e-portfolio. Another option would be to provide print-on-demand, for example allowing the e-portfolio to be turned into a good quality publication.

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2. What are the benefits of these practices?

In this section we explore the wide range of benefits that e-portfolio use may give. The key points are marked in bold, and used in the E-portfolio Requirements Form in Appendix A. It is important to recognize that not all design implementations of the e-portfolio pattern may give all of these benefits. In any given design, some benefits are privileged (intentionally or unintentionally) over others. In some cases, the aim of achieving different benefits in the same system can lead to conflicts.

The e-portfolio might be intended as a presentation for internal or external audiences, over short or long (even lifelong) spans of time. This might include official accredited data (and could include means for authenticating data). Alternatively, the explicit aim might be as a **prompt and focus for reflective and reflexive thinking and writing**. The student might record an event in or add a resource to their e-portfolio, write about the event or resource from an academic perspective, and write reflexively about their decision making and ways of responding to it. An e-portfolio that is used collaboratively (e.g. with a mentor) **aids the operation of interpersonal reflections and reflexivity, and the development of sophisticated self and peer review skills.** More usually it is a combination of both summative and formative motivations, with an emphasis more on one or the other. This can seem to be an ambiguity, but may in fact address variations in attitudes and motivations. For some people, the social reward of sharing one's achievements motivates reflective activity. Other people might find the process of working out and presenting their reflective considerations to be the prime motivation.

Reflexivity (reflecting on oneself) happens in different ways for different people (Archer, 2007) and that may result in differences in how e-portfolios are used by students. Margaret Archer's longitudinal study of Warwick undergraduates found a strong connection between an individual's prefered *mode of reflexivity (communicative, autonomous, meta* or *fractured)*, their engagement with university services, the alignment of the self with the university (with implications for how strongly branded an e-portfolio should be), attitude to structural constraints, and interest in building a personal reflective portfolio (Archer, 2012: p.180). Variations in mode of reflexivity may well have a significant impact on the use of e-portfolios. A system that fits well with, for example, autonomous reflexives (who tend towards instrumental reasoning and corporate careers), might be unattractive to a meta-reflexive (who tend towards critique and creativity). Communicative reflexives might value a system that connects more easily with their friends and family away from university (perhaps they will always prefer Facebook). With autonomous and meta reflexives being the predominant groups amongst students, their quite different *modus operandi* and responses to the *situational logics of opportunity* could result in very different responses to e-portfolio building. As Archer writes concerning meta-reflexives:

"if their involvements embrace organizations, such as the students' union, these are strictly *ad experimentum* and display none of the 'careerism' of the autonomous subjects with their instrumental rational approach to building up their CVs." (Archer, 2012: p.222)

As with CV building, so also with e-portfolio building. An e-portfolio system that is flexible enough to cater for all reflexive types, on the other hand, could **provoke students to think more reflectively about their preferred mode of reflexivity and its consequences.** The e-portfolio therefore plays varying roles in learning and development. The use of an e-portfolio is affected by these variations, and in turn may **change individual and collective reflective and reflexive practices, in positive ways** (if designed and supported well). When academic and professional disciplines are changing fast, for example in response to new digital methods and affordances (Weller, 2011), e-portfolios can **help us to understand, reflect upon and collectively form a response to innovations.**

E-portfolios can embody workflows over short or long periods of time. In many cases learning involves learning to operate using appropriate workflows. The workflow might be a core learning objective, or it might be needed to achieve other objectives. For example, there are many recommended workflows for activities including writing essays, doing experiments, reading a book, giving presentations, completing a module. Workflows can be built into e-portfolios, either as visual representations, as strong design features (enablements, constraints, gates, action funnels etc), or as scaffolding and soft design features (customisable). **E-portfolios help students to follow, learn and create academic workflows**.

Considering the e-portfolio from a constructionist (Papert *et al*, 1991) perspective shows how it can play an **integrative role, allowing the student to connect together discrete aspects of their development within and across modules** (Mason *et al*, 2004: p. 724), and a **catalytic role in the self-development of the student as an individual with an academic discipline**. The e-portfolio is "an active vehicle of learning" (Johnston, 2004). This fits closely with the concept of *personal development planning* (PDP) that is actively promoted by the QAA (2009). **The e-portfolio may be a key tool in the PDP process**. As a cohesive and attractively designed product, **the e-portfolio may provide the student with an object to be proud of, with positive consequences for motivation.** But it can do more. The construction of the e-portfolio mirrors (and makes visible) the construction of the student and their ideas through their studies. The student is able to then modify this representation, perhaps trialling and adopting a differentiated identity. They may "construct theories" about themselves "by arranging and rearranging, by negotiating and renegotiating with a set of well-known materials" (Turkle & Papert, 1991: p.169). An e-portfolio platform that has private and public areas (clearly zoned) **makes it easy for the student to try out ideas before taking them to a wider audience.** However, there diversity of ways in which different people and different subjects go about constructing knowledge (the *epistemological pluralism* described by Turkle and Papert) may

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again have serious implications for the design of a university wide generic system. A more flexible approach, on the other hand, **may act to promote a culture of reflexive epistemological consideration and experimentation amongst the students.** This constructionist aspect, in which the student is responsible for the construction (and through that develops a capability to construct), marks the difference between an e-portfolio system and a traditional content-transmission oriented VLE.

The challenges involved in creating and maintaining an e-portfolio may also help the student to **develop transferable skills**. These include:

> Generating and sustaining motivation and interest.
> Ownership and responsibility.
> Selectivity.
> Recording events and progress.
> Prioritisation.
> Writing reflectively.
> Writing for specific audiences.
> Writing for the public.
> Writing for online reading.
> Free-form self-directed writing.
> Scaffolded writing.
> Going from scaffolded writing to free-form self-directed writing.
> Making design choices.
> Understanding access controls.
> Manipulating the e-portfolio technology.

In addition, the increase in the amount of student activity that is recorded electronically, and easily accessed by tutors and course managers, means **an increase in opportunities for giving feedback (micro-feedback)** and for getting both **general and detailed knowledge of individual students**. This may be especially valuable in cases where physical distance or time pressures make student-tutor interaction difficult, for example where students spend time abroad or on placement. E-portfolios can **help tutors and students stay connected in a meaningful, supported way**.

Aggregations may be used to create reports across sets of students. For example, if all students were asked to reflect upon what they most like and dislike in a module, this can easily be compiled into a report. E-portfolios may allow for **faster review and modification of teaching designs**. In addition, similar activities may be compared in a set of modules across a programme, department, institution and beyond, **supporting benchmarking and the development of a shared understanding of quality**. This could help to address what Paul

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Greatrix diagnoses as the problems inherent in benchmarking for quality and standards:

"you cannot pre-specify creativity; the danger that the atomising effect of the approach ignores overarching capabilities; the need to reflect and encompass development of the subject over time; the difficulty of capturing explicitly and semi-permanently the dynamic nature of knowledge; and the bureaucratisation of learning inherent in this kind of approach." (Greatrix, 2005: loc 7176)

Through looking at e-portfolios across courses, departments and universities, we (as in all stakeholders including students) might **more easily engage in constructive dialogue on "the nature, meaning, exposition and exploration of the characteristics of or evidence for quality"** (*ibid.* Kindle location 1937). The groundedness of such an approach would **assist universities in conducting "a system of continuous internal review which is 'firmly rooted in the intellectual life of the institution'."** (*ibid.* Kindle location 7268) resulting in "something closer to the Kushner and MacDonald notion of democratic evaluation which is, for all of its ideological underpinnings, certainly more attuned to the specific context of HE." (*ibid.* Kindle location 7285)

In his book *The Digital Scholar*, Martin Weller argues that:

"The already difficult task of assessing research and scholarly activity in highly specialised fields is only going to be made more difficult by introducing digital scholarship...A willingness to recognise new types of output and activity brings into focus the next significant barrier, which is how to measure or recognise quality in these widely varied formats."

The challenge of establishing *reliability* in benchmarking quality across institutions is closely related to the challenge of benchmarking quality across diverse students. E-portfolios can help us with the challenge of assessment in a similar way. Where the aim of teaching is to encourage students to develop their own individual response, perhaps an interdisciplinary response, assessment is more difficult than where the expectation is uniformity. The problem of diversity in assessed products is made greater by an widening of the range of media, formats and platforms within which the student can work. The e-portfolio can help **address the challenge of assessing diverse student outputs** by bringing them together into one common format, in one place. The diverse activities represented in an e-portfolio, perhaps created across a range of different learning and working contexts, can be used for the six types of assessment objective:

1. the degree to which the student engages with learning;
2. the student's capability to do some more or less concretely specified actions in the context in which learning takes place (the combination of students, teachers, learning designs, facilities and institution);
3. the student's ability to apply their capabilities in a context outside of that in which they

       learn (for example, a workplace);
4. the student's ability to apply their capabilities in unknown contexts elsewhere or in the future;
5. the student's meta-capability for developing their capabilities further;
6. the student's meta-capability for helping others to develop their capabilities.

E-portfolios offer a way in which **we can assess the full range of key aspects of learning,** and we can do so **over a sustained period**. This may also provide **a location for the collaborative assessment of interdisciplinary work**, with experts from multiple disciplines coming together online to assess an e-portfolio, perhaps even with collateral benefits for interdisciplinary work more broadly.

Where e-portfolios are made available on a peer-to-peer basis, they can benefit other students. Selected parts of an e-portfolio might be made available to provide inspiration and examples to fellow students (or future students). Or students might read, assess and feedback upon the work of their peers. This could happen, for example, within an *action learning* approach. **E-portfolios can significantly enhance peer support and learning.**

Finally, e-portfolios **make personal achievements visible in a way that benefits the wider community, including employers, funders and parents.**

3. Example implementations at Warwick

A specific implementation of the e-portfolio pattern selects, assembles and emphasises a subset of the features described in section 1 to attain a subset of the benefits described in section 2. At Warwick we have seen a cross-section of some but not all of the possible assemblages. This is giving us an improving sense of where and why different approaches fit. However, our understanding has been limited by what the available resources, including IT platforms afford, and by the availability of opportunities for real academic engagement with e-portfolios.

A note on platforms:

Until 2013, Warwick did not have a centrally supported specialist e-portfolio platform. These examples have been based within either a Moodle + Mahara instance (externally hosted) provided by the Language Centre, or have exploited the capabilities of the fully featured, reliable and efficient institutional content management system, Sitebuilder. In the last year, with advances in the Sitebuilder tool (data pages, online forms) and client-side Javascript programming (especially jQuery), it has become possible for web designers and Interaction Design for Learning specialists to automate and construct all required workflows by manipulating

the standard features of Sitebuilder in Javascript. This enables all kinds of templating and scaffolding of content and process. For example, we can set up a series if forms, each of which helps the student to create reflective content within a workflow. It is, however, still quite an expert-level process to set up for the student (more setup work for the teachers or technologists, much less technical ability required from the student). For the student, creating content is fast, intuitive and *what you see is what you get* (WYSIWYG) - like working on a word processor document.

In 2013 the Mahara e-portfolio tool was added to the institutional VLE, Moodle, but with only a limited amount of user support, and no training provision for students. Mahara applies a very different interpretation of the basic e-portfolios design pattern, with less structure and workflow, and more creative freedom (and responsibility) for the student, within the constraints of the Mahara framework (a limited range of entities including file lists, journals, pages, but with little scope for customisation). For example, Mahara allows students to create one or more *journals* (blogs). Creating entries is freeform, with no scaffolding through templated entries. Using Mahara is much less WYSIWYG, requiring the student to have a more comprehensive understanding of how functionality on different parts of the Mahara system is combined through a set if quite different tasks into an end result. Whereas a more scaffolded and WYSIWYG approach can be used with little technical knowledge, using Mahara is equivalent to the technical challenge of using a complete software application with all of its idiosyncrasies and technical concepts. Mahara adds a significant extra dimension to what the student needs to learn.

When considering e-portfolio platforms, interfaces and interaction designs, it is especially important for us to analyse the *cognitive loads* that they impose on the student. Cognitive load is one of the founding concepts of learning technology design and consultancy. Portfolio creation in itself demands significant mental efforts, with several dimensions of challenge and skill compounded into a single activity (discipline specific content, composition, communications etc). Add to that the reflective and reflexive dimensions, which for some students is a very significant challenge. We can class these inherent challenges as being *intrinsic cognitive loads* (Pass, Renkel & Sweller, 2003: p.1). The e-portfolio system design could add significant *extraneous cognitive load* (*ibid.*: p.2) in addition to this, and without any additional benefit to the student (for example, in developing transferable technology skills). How can we evaluate this additional load? Pass *et al.* provide a simple schema, based upon the concept of *element interactivity*. Where there is high additional cognitive load:

"The elements of high element-interactivity material can be learned individually, but they cannot be understood until all of the elements and their interactions are processed simultaneously." (*Ibid.*: p.1)

So, for example, to achieve a single reflective task in the e-portfolio, the student needs to successfully understand and use, in combination, different functions in different parts of the

interface. They might even have to choose, find, initiate, complete and find their way out off several distinct workflows (with series of web pages), not immediately connected to the task in hand. The situation is especially bad when they need to have a cognitive model of the whole system in order to achieve this. Alternatively, a more WYSIWYG approach allows the student to achieve a task while remaining focussed on the task, without having to think about combining too many functions, too many separate actions, in places that are not immediately in the context of the task they are working on. In these cases:

"Element interactivity is low because each item can be understood and learned without reference to any other items." (*ibid.*: p.1)

And:

"As a consequence, high element-interactivity material is difficult to understand." (*ibid.*: p.1)

The probable consequences of high extraneous cognitive load are either the need to additional training and support, or the abandonment of the system. As a good measure, in the higher education context (where students have many other more important things to worry about), a system should be chosen that does not require additional training and support, outside of the *intrinsic* cognitive load that is integral to the learning objectives of using an e-portfolio.

Also of relevance, Wordpress is used by some postgraduate students and staff in an e-portfolio style approach. Out-of-the-box, Wordpress makes it relatively easy for users to create blog entries and summative pages. It is much more WYSIWYG than Mahara, and could have scaffolded reflection and workflow added (using the same kinds of approach used with Sitebuilder). There have been no coordinated projects using Wordpress for e-portfolios at Warwick.

Emerging ubiquitous computing (ubicomp) platforms and practices may disrupt all of these technology platforms, unless work is done to adapt and integrate these new ways of working. Ubicomp is enabled by the widespread availability of wireless internet connectivity (wifi or cellular), mobile hardware (phones, tablets, and future new devices such as smart watches), and cloud-based services. For example, Evernote is a popular service for note taking, organisation and (increasingly) collaboration. A student might be working in an archive and snap an image of a text using the camera on their mobile phone (increasingly high quality). They could add an audio recording of an interview with an archivist, along with data on the record. This might be captured into an Evernote note (Evernote has apps for almost all platforms). When they move into an area with wifi coverage, Evernote uploads the new note, with its images and audio, into the students electronic notebook. The student returns to their home and opens the Evernote application on their laptop (there are versions for Windows and Mac as well as a web browser based light version). The student reviews the notes that they have created, and they collect them

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together with a reflective. They tag the reflective narrative as "reflections of research". They have shared their notebook with their peers and tutor, who are alerted to updates and can view them through the Evernote application, a web page, or through an RSS reader. Now compare this free-flowing workflow, embedded into the research process as it is happening, with the clunkier, less immediate Web 2.0 alternative. Ubiquitous computing has the capability of drawing more "reflection-in-action" (Schön, 1990) into the e-portfolio, providing better material for deeper "reflection-on-action", and a more realistic view on the activities and thinking of the student. We are starting to see platforms like Evernote being used by "digital natives", but without necessarily exploiting their full potential as e-portfolio tools for achieving the benefits described above. There may be an emergent shift towards such platforms, as people tend towards more immediate technologies that increase the value of e-portfolio ownership, and which reduce *extraneous cognitive load.* This is a major development that must be investigated further.

PhD e-portfolios, Graduate School (managed by Careers and Skills) and embedded into some departments), 2004 onwards

A simple web-publishing based system using Sitebuilder and starting from a basic template. The PhD student requests an e-portfolio (using an online form). In some cases departments advise their students to do this. In a few cases, induction sessions are provided for whole groups. Using a template (home page, cv, research activities, teaching activities) a set of e-portfolio pages are created for the student (either in the central PhD e-portfolios web site, or in an e-portfolio section of their department web site if it exists). The student is given editing permissions, and some guidance. They edit the pages using standard Sitebuilder tools. When they are ready to release their pages to the public, they request that they are made public by the e-portfolio manager in Careers and Skills (who has admin rights over all e-portfolios, and can change the permissions using Sitebuilder's admin tools). In this case, emphasis is more towards the public presentation of the student's work, their interests and their achievements. However, in some cases this will give cause for reflection and self-construction. Many PhD students from all departments have used this service. There is no simple export system, but future e-portfolio access can be maintained through Graduate School membership.

Dentistry clinical practice, 2008 - 2013

Each student is automatically given a set of pages in a Sitebuilder web site, created manually from a template page (but not using the new Sitebuilder templating system). The student's homepage acts as an index to the module components that they have studied, and the case documentation they create for each component. The e-portfolio is a collection of learning tasks, available for tutor review. There is no public-facing element, or personalisation beyond representing the student's chosen study path. Within each component, students create a gallery page for each case they are documenting (a series of photos of the patient and their teeth) along with case documentation. This documentation is confidential. Tutors may then review these

documents, leaving comments through the Sitebuilder comment system.

The system currently requires a lot of manual work to set up and maintain. Each student might have up to 1000 cases documented. The workflow involved in creating case documentation and using it in learning, by the student and their tutors, is not constrained/enabled/directed systematically in the system. In 2013 WMS are seeking to move to a more sustainable system with more templating and embedded workflow.

Undergraduate Research Scholarship Scheme portfolios, 2012

A more complex approach, explicitly aiming to exploit the constructionist/constructivist potential of e-portfolio practice, and to develop the reflective/reflexive capabilities of the students. It is based around an existing four-month timeline of recording and reflecting activities, matched with a sequence of structured blogging activities, poster creation and abstract writing, and summatively presented in a single page at the end of the timeline. 170 Undergraduate Research Scholarship Scheme students used the system. Each student created a blog site using Warwick Blogs. A *personalised dashboard interface* (built as a jQuery application in Sitebuilder) presented a personalised, updated timeline to the students, with links to *blog forms* used for undertaking the reflective tasks (initial reflections, action planning, development goals, final reflections). The completed reflections were then posted as blog entries into the student's personal blog. Mentors could follow their mentees using blog aggregation and RSS, and leave feedback. At the end of the project, each student was given a templated Sitebuilder page, with simplified and constrained editing. They completed sections on Project Information, About the Researcher (including a photo), About the Project, File Uploads (poster, abstract, optional cv). They also had the opportunity to re-edit and release selected reflective blog entries. This would import the entry into Sitebuilder as a subpage of the e-portfolio.

The reflective activities proved to be useful, and the final e-portfolio building activity was popular. However, the combination of Warwick Blogs, blog forms and Sitebuilder proved to be too clunky. The use of two separate platforms dissipated the positive integrationary potential of the e-portfolio. The students did not feel that they were constructing a single cohesive narrative through their e-portfolios. Consequently, the expected constructionist effects failed to take hold.

French Department, year abroad portfolios, 2012

In 2012, French Studies students were encouraged to create e-portfolios during their time abroad. The students undertake a variety of paid and voluntary work and study, meaning that they may become quite detached from their home university and course. The e-portfolio had the dual aim of giving the student a place to enframe their experiences within a learning context, and helping them to collect, consider and use content for the assignments that they had to undertake while away. In addition, the creation of material about the year abroad experience could benefit

future students and the department. The Mahara e-portfolio system was used, as part of the Language Centre's independent Moodle system. The students were given basic technical instruction, and guidance on how to it could be useful to them. Mahara allows for relatively easy web browser based collecting and creation of content, and some templating. However, in this case the students were left to construct their e-portfolio sites without scaffolding. The design of Mahara also tends to lead to large, text-heavy, deeply scrolling, poorly laid-out web pages, except for where the student has made a significant effort to embrace good design. It tends more towards a scrapbook pattern. The lack of scaffolding and workflow can be a positive benefit for students who prefer freedom and are prepared to put in a lot of work. In this case, a minority embraced it, and produced good products. However, it seems to have been more end-product focussed, with opportunities for and cases of significant reflection not being recorded and exploited by the students.

History Department, Making History e-portfolios, 2012 onwards (IATL Funded project with Mark Knights)

Starting in October 2012, each first year undergraduate following the core Making History module (200 students, single and joint honours) has an e-portfolio page within the module website (Sitebuilder based). Over the year, additional pages are added as subpages (this is an automated bulk operation). The pages are created from a template e-portfolio. There is a *dashboard* page for students, listing the tasks that have been assigned, the tasks they are.working on, and the ones they have completed. The student's homepage is structured as a series of tasks in which they use mini editors (constrained editors) to write an introductory statement about themselves. The subpages contain other reflective tasks, relevant to different points in the module over the year. Each page has a task status (task, task-started, task-completed). When the student starts work on a task it is marked as task-started. When they think they have completed a page, they use a link to mark it as task-completed. The course convenor and the personal tutors are able to see a page that lists each of the students, and shows which tasks they have started and completed. The tutor clicks on a link to a completed task and leaves feedback at the bottom of the page in an area that students cannot edit. There are also further reporting aggregation pages, listing all students who have not yet completed a specific task, or all of the answers to a specific question (for example, all student responses to the question "what have you enjoyed the most about the module?" These reports have been used in module review. File upload tasks have also been added to the e-portfolios. In the Summer Term, some students will be creating assessed digital projects within their e-portfolios using standard Sitebuilder features.

History of Art, progress diaries, 2012 onwards

The History of Art department has used the same Sitebuilder based scaffolded e-portfolio approach as that used in History. In this case, it is part of the personal tutor process, with entries

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being written in preparation for and reflecting upon personal tutor meetings.

Undergraduate Research Scholarship Scheme portfolios, 2013

Starting in 2013, the URSS is using a streamlined and enhanced version of its e-portfolio approach with all 245 students and 8 mentors. The use of blogs and blog forms has been replaced by an entirely Sitebuilder based system, based upon that used in History and the History of Art. However, the separate *dashboard* page has been replaced by a *ribbon* interface, embedded near to the top of each page. The ribbon contains 7 panels. The first 6 of these each presents information about and a link to one of the *task pages*. The last panel has links to support. Each of the 6 pages is to be used at a different point in the timeline, this is stated in the page's panel, which acts to visually represent the timeline and its workflow. The home page is a public page (in fact initially limited to university members). The other pages are restricted to the student, mentors and URSS management team. Each page has one of three statuses (task, task-started, task-completed). A page is marked as task-started when the student first edits one of the editable areas on it (on each page a set of editable paragraphs and file uploads act as enabling-prompting constraints scaffolding the student's attentions). They can then click on the Mark Complete link on its panel in the ribbon. Each e-portfolio contains a Mentor Communications forum. When a task is marked as completed, an auto generated message is posted into the forum (e.g. Robert has completed his Action Plan). The student's mentor receives an email to alert them. They can then post feedback into the message in the forum. The student is alerted to the response by email and can reply. The number of comments on a page is listed on its ribbon panel. The Mentor Communications forum may also be used for other student-mentor communications. Each mentor also has a page that lists their students, progress, links etc. Report pages are being created to give the URSS management team an overview of activities. At the end of the projects there will be some file upload tasks, putting a poster, abstract and optional cv on the public page. There will also be an approval workflow leading to the public release of the Public Page, and possibly also reflective pages. Further features will be considered.

French Studies, year abroad portfolios, 2013

Year abroad students will use a system based upon the *ribbon* portfolios of URSS 2013. In this case, they will create 4 separate portfolios for each of four interconnected activities. There will be 3 *dossier* building activities (a dossier is a collection of useful resources and reflections relating to a specific issue, theme or question). The fourth portfolio us a writing activity.

The dossiers will each follow the same pattern. For each, the students will be expected to provide a specified number of resources of each type (video, online text, audio, image) - and more if they want. Each resource will be added into a templated page, specifically designed for that type of resource. For example, the video page will contain an area for adding the video

(YouTube, Vimeo). There will also be text fields for a description and interpretation, and ideas on how to use the video in academic work. The student will also need to list new vocabulary used in the resource (this could go into a glossary). Resources will be keyword tagged using a schematic crowd sourced by the students. Students will be able to see resources contributed by other students, and see related resources.

The fourth portfolio will represent an essay writing workflow, based upon the resources collected in the dossiers.

Language Centre Mahara, Teresa MacKinnon

This has developed extension of Teresa's work to establish a VLE platform and technology-enhanced teaching practices in language learning. The Language Centre use an instance of the Moodle VLE that is tailored to their specific pedagogical and administrative requirements. Mahara is provided as a place in which students can develop portfolios to record and reflect upon their engagement with languages and cultures. The project and its results are reported in a project report by Teresa MacKinnon (2102). This summary is based upon that report.

The Language Centre project is our only example of assessed e-portfolio use at Warwick, with the assessment of the e-portfolio contributing 20% of the final mark. It probably demanded more of the students than the non-assessed projects, justifying the additional personal responsibility and effort required in constructing an e-portfolio through the Mahara based approach (without as much scaffolding). In the first two years, e-portfolio use has been targeted at level 5 and above language students (post A level) studying French, Japanese or Chinese language courses. In the first year there were 100 e-portfolios submitted. The project report states a dual aim, providing opportunities for students and for teachers (taken from the report):

- to support and reward student engagement in the language learning process;
- to collaborate as teaching professionals across language groups and make explicit the skills we need students to develop.

The e-portfolios should demonstrate both the student's acquired language skills and their meta-learning capabilities (taken from the report):

- the steps taken by students to increase understanding of the learning process;
- the analytical skills acquired in diagnosing a problem area and taking relevant steps to address it;
- the acquisition of communication skills which are relevant to employment in a modern age.

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In these ways, this successful project attained some of the key benefits of e-portfolio use described above. The role of the e-portfolio in enhancing tutor-tutor reflection on teaching was especially interesting. The project used a "communities of practice" approach from the outset, so as to collaboratively develop e-portfolio based teaching and learning. However, the process of working with and assessing e-portfolios (which took an average of 30 minutes for each student's work), strengthened the more general *teaching* community of practice - suggesting the power of e-portfolios to transform teaching cultures and practices. Another significant aspect of this project, marking it out from others, was the much clearer emphasis upon *narrative building* through the e-portfolio. The process was explicitly structured as one of *collect*, *reflect*, *present* in which narratives about personal development and learning would form. Mahara supports this approach especially well, if the student has the capability and motivation to build narratives of this kind. The outcomes can be of much greater power - narratives get carried with individuals and communities over time, are referred back to and retold, and provide the material for reflective deliberation and planning.

Institute of Education, Jo Trowsdale (IATL funded)

This project has used the Language Centre Moodle/Mahara platform to investigate the question:

"Can developing Mahara e-portfolios foster the habits of reflection and connection to enhance learning and professionalism in student teachers on a school-based route?"

Results not yet available.

4. Practices in use that relate to e-portfolios

Beyond the instances listed above there are other portfolio-like practices. There are technology based practices that contain aspects of the e-portfolio approach. There are non-technological practices that might be transferred to a digital platform and benefit from additional affordances.

Blogs have been centrally provided and supported at Warwick since 2004, through the bespoke-developed Warwick Blogs platform. This initiative originated in the need for a platform to support personal development planning (PDP). It was originally championed by the Warwick Skills Programme (later merging with the Careers Service). The notion was that students would be guided and prompted (by a semi-automated system) to record and reflect upon their learning. They would, over time, build up a portfolio of blog entries to be used reflexively, in tutorials, and in creating a public profile. Warwick Blogs supports the creation of content for various access zones (including Only Me, Warwick Only and Public). However, the existing student membership data did not support the easy creation of Tutor Only and Course Peer Only posts. It also did not directly support scaffolded post creation (a basic system was written in Javascript, and used

heavily by Careers and some academic departments). A blog owner could also create a static list of key posts, forming a portfolio of entries, but this was not a simple process. During the period of Warwick Blogs' great popularity, it was largely used as a social platform. The presence of many social blog posts on the system homepage encouraged users to see it as being targeted at social not academic blogging.

Outside of the centrally supported Warwick Blogs, we have seen occasional use of other blog platforms in a more e-portfolio-like way. This is however rare, and still the domain of digital natives. Other social network platforms are used in ways similar to e-portfolios, including the massively popular Facebook and the more professionally oriented LinkedIn. There is, however, much less scope in these platforms for direct integration into academic practice. In recent years specialist social network platforms have emerged to serve academics, including Academic.edu. These platforms tend to provide features for established academics, rather than being designed to support students learning to become academics.

Below the digital native's radar for detecting new applications of technology, there are many portfolio-like practices that rely upon old-fashioned materials. Nicholas Monk of the Institute for Advanced Teaching and Learning has promoted the resurgence of a lost academic art: *the commonplace book*. Up until the early 20th Century, the practice of *commonplacing* was taught to university students and used widely in academia, the arts and beyond. A commonplace book literally provides a "common place" into which the author (or keeper) assembles interesting, important and inspiring materials from their experiences. The act of assembling is itself a form of commentary. In addition, artistic elements and text are added to further enframe and reflect upon the experiences and sources represented. The commonplace book is however more than just a scrapbook, it's presentation matters, it says something about the person, their values and character, and their development. It also has a physical presence that may be difficult to replicate digitally. The book is an aesthetically interesting object when encountered hands-on.

Similarly resistant to digitisation, scientists keep log books of their experimental works. These records seem to have a dual function: accuracy in recalling and replicating experimental conditions is of great importance; scientists do also treat their log books as objects for reflection and reflexive consideration.

5. Next steps

The adoption of e-portfolio based teaching and learning delivers significant benefits to students and teachers. However, as predicted, the newly available opportunities to try this approach, afforded by developments in technology, are causing an evolution in our understanding of how they might be used, and impacting upon the development of requirements for technologies to

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support learning designs. This is still a rapidly developing situation, with some initial patterns emerging. At this stage technology and technologists must play a flexible role, supporting the hands-on experimentation, reflection and design agency of the end-users (teachers, students, administrators, employers etc). The consideration of appropriate cognitive load is especially important. All systems should be analysed for this, and evaluated against the purposes for which they will be used and the contexts into which they will be deployed. This is especially important at a time of rapid innovation in platforms and services (the impact of the ubiquitous computing revolution). In each of the cases reported above, being able to try out for real actual platforms, and develop ideas and practices based upon those results has been extremely fruitful, even when the platforms in use have been a little too inflexible to enable rapid experimentation and design.

The key recommendation of this report, at this stage, is that this very significant development in academic practice be supported more effectively through the provision of tools and services that will enable faster, more free-ranging experimentation, design, implementation and review. A flexible platform, matched with good design and technical support, with appropriate design values (focussing on the academic rather than the technical).

Also, as an aid to this design thinking, the many benefits of e-portfolios listed in Section 2 have been compiled into a list that can be used to aid people in considering what aspects of e-portfolio use might be important to them (see Appendix A). This is unlikely to be a comprehensive list, and will no doubt grow as it is used. It will be used to work with potential and existing e-portfolio users to develop clarity on what we want e-portfolios to do for us, and how they might do it.

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Appendix A: Potential benefits of the e-portfolio approach

Suggested use: read through the list and identify benefits that would be of a very significant priority to you; identify benefits that are of no interest; identify points that you would like to explore further; are there any other benefits you can foresee?

1. a prompt and focus for reflective and reflexive thinking and writing;
2. the operation of interpersonal reflections and reflexivity;
3. the development of sophisticated self and peer review skills;
4. provoke students to think more reflectively about their preferred mode of reflexivity and its consequences;
5. change individual and collective reflective and reflexive practices;
6. help us to understand, reflect upon and collectively form a response to innovations;
7. help students to follow, learn and create academic workflows;
8. integrative role, allowing the student to connect together discrete aspects of their development within and across modules;
9. catalytic role in the self-development of the student as an individual with an academic discipline;
10. key tool in the Personal Development Planning process;
11. provide the student with an object to be proud of, with positive consequences for motivation;
12. makes it easy for the student to try out ideas before taking them to a wider audience;
13. act to promote a culture of reflexive epistemological consideration and experimentation amongst the students;
14. develop transferable skills;
15. increase in opportunities for giving feedback (micro-feedback);
16. provide teachers with general and detailed knowledge of individual students;
17. help tutors and students stay connected in a meaningful, supported way;
18. faster review and modification of teaching designs;
19. supporting benchmarking and the development of a shared understanding of quality;
20. more easily engage in constructive dialogue on "the nature, meaning, exposition and exploration of the characteristics of or evidence for quality;
21. assist universities in conducting "a system of continuous internal review which is 'firmly rooted in the intellectual life of the institution'";
22. address the challenge of assessing diverse student outputs;
23. we can assess the full range of key aspects of learning;
24. over a longer sustained period;
25. a location for the collaborative assessment of interdisciplinary work;
26. Where e-portfolios are available on a peer-to-peer basis, they can benefit other students;
27. E-portfolios can significantly enhance peer support and learning;
28. make personal achievements visible in a way that benefits the wider community,

including employers, funders and parents.