NEW DIRECTIONS FOR THE DOCTORAL THESIS

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ABSTRACT

Purpose — *This chapter focuses on the impact of digitization on the conception, development and examination of the doctoral thesis in the contemporary university.*

Methodology — *The approach taken is that of reflective inquiry. The author has taken a lead role in the editing of two handbooks for Sage: one on e-learning research and the other on the digital dissertation/thesis, and this chapter reflects on the changes taking place in higher education as a result of digitization. A number of examples are used to illustrate the possibilities afforded by digitization not only at doctoral levels but also in all dissertations.*

Findings — *It is proposed that digitization affects not only the conception and direction of doctoral research for the student but it has implications also for supervisors, those who 'upgrade' work from MPhil to PhD levels and also for examiners and librarians. Changes in the format of the presentation of the digital thesis allow moving image and sound, as well as still images, to be incorporated into the main body of the text rather than be relegated to an appendix (e.g. in a CD-Rom).*

The storage of the completed thesis in digital form, via a number of different repositories, allows for greater access and use.

Research implications — *One of the major implications of the digital thesis is that all universities must regularly re-visit their regulations to ensure that the parameters for doctoral research are clear, and that they are appropriate for the kind of research that is undertaken by students.*

Many universities are now making a digital copy of the thesis for principal submission, with print copies as optional.

Originality and significance — *Consideration of the implications of the digital thesis for students and universities is essential not only in terms of knowledge creation but also in terms of validation of such knowledge and its dissemination and use.*

INTRODUCTION

In the *Handbook of Digital Dissertations and Theses* (Andrews, Borg, Boyd Davis, Domingo, & England, 2012), my fellow editors and authors mapped out what impact, we thought, digitization has on the nature and format of the dissertation and thesis. Our approach, though initially focussed on doctorates, was applied in the end to any kind of dissertation — at undergraduate, Masters and doctoral levels. In this chapter, however, I focus more sharply again on the doctoral thesis: its function, its possibilities and what these say about the nature of knowledge creation at doctoral level within a wider context of the present volume, with its focus on leadership and policy implications. I include consideration of the possible direction that digitization can afford to the doctoral student but also look at the kinds of knowledge that are being generated by the contemporary doctorate in the arts, social sciences and humanities. My approach — typical of someone with a background in the communication arts (see Andrews, 2014) — begins with the nature and format of the contemporary doctorate but moves backwards and forwards between the genre itself and the social and political contexts of the genre. It looks at current practice in an education and social science research institution with a large cohort of doctoral researchers where

1 digitization and multi-modality have impacted on the creation, develop-
ment and examination of the doctoral   thesis.
3   Digitization is changing the nature of doctoral submission, though the
possibilities of this shift are yet to be fully realized in practice. For some
5 years, many universities in the United Kingdom have required, like many
universities worldwide, that the final written (printed) thesis submission   —
7 two copies, softbound until approved by the examiners and then hard-
bound for the library shelves and public access — should be *accompanied*
9 by a digital version in Word or in a pdf format. It makes sense for candi-
dates to submit the initial version in Word as well as printed form so that
11 amendments and corrections can be incorporated after the viva.   The finally
approved thesis can be submitted in pdf and then stored digitally by the
13 university in its repository of theses, as well as submitted to EthOS at the
British Library. But from the period since 2010, the guidance for submis-
15 sion has been changing. In a pivotal and indicative shift of practice (and
possibility) in 2013 at my own university, the digital submission became   an
17 option as the *principal* text, with the printed softbound copies an   *accessory*
to the digital version.
19   Such practices have been evident since at least 2010 when the University
of Illinois at Urbana-Champaign, more radically, indicated to its doctoral
21 students that it would no longer accept printed, softbound or hardbound
copies but would receive only the digital version of the thesis. Readership
23 of the submitted digital theses increased 10-fold in the first year. Such a
change in submission requirements has a potentially profound impact on
25 the whole doctoral research process. Knowing that digital submission is
required will encourage some students to conceive of their research pro-
27 jects, ab initio, differently. A major consideration will be the degree to
which multi-modal approaches to the presentation of the thesis are
29 included.[1] Multi-modality suggests the inclusion of word, still image,
moving image, sound, gesture etc., and it is possible to conceive   of a study
31 that embraces some or all of these modes of communication. Such a broad
use of and combination of modes have been possible in arts-based   research
33 for decades — art installations, exhibitions and sculptures are presented,
usually as *part* of the doctoral submission (accompanied by a 'critical'
35 dimension, conventionally supplied in word form). But the practice   is rela-
tively new in the humanities and social sciences, bound as they have been
37 more conventionally in the 'classic' verbal (spoken and written) tradition.
However, photographs or other forms of digital still image have already
39 become part of the conventional printed thesis. Now, as digitization influ-
ences practice more deeply, an arts, humanities or social sciences research

1 student could incorporate, for example, documentary film as part of their
   submission.
3   The reciprocal relationship between new technologies on the one hand
   and new practices and forms of knowledge creation on the other has   impli-
5 cations beyond that of format and presentation. Among   these implications
   are increased researcher agency, a changing relationship between   research/
7 doctoral study and the student researcher and the process of research. In
   the following sections, I try to chart some of these changes.
9

11

CONCEPTION

13

   The *conception* of the research topic, and its subsequent treatment by the
15 research student, needs to be dwelled on further before we move to other
   implications of the digital thesis. These may continue to be *about* a topic   in
17 a post hoc approach. Such post hoc abstraction is partly a result of the nat-
   ure of the verbal mode: it consists of critical, reflective words about phe-
19 nomena. However, the inclusion of other modes of communication and
   representation means that the researcher and the reader can get closer to
21 the primary experience that is being investigated. Instead of (or as   well as)
   writing about film, the researcher can show the film or film extracts; instead
23 of (or as well as) writing about music through the prisms of,   first, notation,
   and second, critical verbal commentary on such notation, the researcher
25 can actually present the music itself as part of the thesis. One could   see the
   proximity of the primary material as a threat to research if we conceive of
27 research only as an abstracted, reflective activity mediated by words. If
   research means, to paraphrase an eighteenth century definition of research
29 in music, 'the seeking of patterns of harmony which once found, are used
   in the piece to played afterwards' (think of pattern-seeking in data through
31 analysis, which once found can be applied to real-world problems and solu-
   tions), then those patterns need to be identified and shown in primary data,
33 even though they might be analysed in another mode.
      Such presentational possibilities raise the question of how studies are
35 framed (see Andrews, 2010), and these need to be made clear in the intro-
   duction to a thesis so that all who read it are clear about the paradigm
37 within which the research project is undertaken, and   more pragmatically,
   what to expect — and how to read it — as they embark on the 'reading' of
39 the thesis.
      What does this more direct form of communication in the doctoral thesis
   say about knowledge and the creation of new knowledge? First,   that

academic framing of knowledge need not be bound by the verbal   code, and that other forms of 'knowing' — visual, aural, synaesthetic, tactile, kinetic — can be validated. Second, that the layering of critical commentary can be arranged and weighted by the research student to indicate precisely where his or her focus of attention is, and how that modal focus of   attention is related to other modes. Third, that 'an original contribution to knowledge' (never well-defined) can take even more various forms, from the offering of new perspectives, to the re-configuration of existing ideas and assumptions, to the presentation of new material and so on.

Fourth, what kinds of argument are presented by a digital thesis that uses a wide set of possibilities as set out above? Argument (the product) and argumentation (the process) are likely to continue to be central to the criteria for success at doctoral level as they are at both Masters and under-graduate levels. Does the move away from a necessarily   linear argumenta-tional sequence in the conventional written/printed thesis — say, in the presentation of a thesis in a website form, where the points of entry are multiple and where the material need not necessarily be read in a prescribed order — compromise the argument of a thesis or could the argument be (partially) constructed by the reader? Can a set of images argue? Can a musical composition be said to make an argument, irrespective of whether it is accompanied by 40,000 words of written critical commentary or not? We are faced here with issues of implied argument and explicit   arguments. Doctoral work tends to the explicit because it is set within an academic context. But such explicitness is not always the choice of those presenting theses for examination and is not a worldwide universality: a doctoral study on the historical emergence of manga as an educational tool, for example (Ellis, 2008), eschewed explicit articulation of its thesis within a Japanese tradition of suggestion and implicitness rather than the   somewhat less refined practice of explicit exposition.

Issues around the *conception* of the digital thesis are considered here because these are central to the kinds of knowledge that are anticipated in a doctoral course of study and to the student who is embarking on that course. The next matter to consider is the *supervision* of that course of study and its implications for the process of research as the basis of a   thesis or dissertation.

SUPERVISION

Supervisors are key not only to the development of a research student's research project, particularly in the structural design of the thesis (the

1 principal aspect that supervisors can be held to account for if the   student is
   not successful), but also for the depth of scholarship, the elegance of the
3 design overall, the degree of theory that is introduced and   the methodologi-
   cal rigour. Above all, the supervisor's role is to guide (navigate) the   student
5 successfully through the demands and rituals of the doctoral journey. It is
   thus all the more important, when there is a new direction to navigate, that
7 the supervisor — even if he or she has not travelled the specific territory —
   is able to map-read and work with the student to ensure a successful
9 passage. Again, this responsibility for navigation comes back to   the regula-
   tions of the university and the guidance offered to the student in terms of
11 criteria for success.
       The regulations at one UK higher education institution include the fol-
13 lowing (I have included only those that are relevant to the argument   of this
   chapter; details about length of registration, eligibility etc. are left   out):
15
       The MPhil/PhD thesis must

17   6.3.1 consist of the candidate's own account of his/her investigations;
       6.3.2 be an integrated whole and present a coherent argument;
19   6.3.3 include a full bibliography and references;
       6.3.4 be written in English and of a satisfactory standard of literary presentation.   (2012
       regulations, p. 6)
21

   and perhaps more pointedly for the purposes of this   chapter:
23
       6.10 If appropriate to the field of study, and subject to approval by the Academic
25   Registrar, a candidate may undertake research leading to the submission of a portfolio
       of original artistic or technological work undertaken during his/her period of registra-
       tion. The work may take the form of, for example, objects, images, films, performances,
27   musical compositions, webpages or software, but must be documented or recorded in
       the portfolio by means appropriate for the purposes of examination and   eventual
29   deposit in the Institute library. The portfolio must include written   commentary on each
       item of artistic or technological work and either an extended analysis of one item or a
       dissertation on a related theme. The written commentaries and extended analysis or dis-
31   sertation must together be no more than 40,000 words. (*ibid.*, p. 7)

33   I will take up four main areas in these regulations that a supervisor and
   student must address if the student decides to go down the route of less
35 conventional thesis. These are the nature of the *argument*,   the *bibliography
   and references,* the *portfolio* and the *written* element. Collectively, these pro-
37 vide the framework for the thesis and, as such, require the guidance of the
   supervisor.
39   Discussion of how *argument* manifests itself in a multi-modal, digital
   thesis was begun above. It also needs to be said that the argument can take

1 various forms. It need not proceed via some of the conventional models,
   like the proving or disproving of a hypothesis or the sequential and logical
3 or quasi-logical setting out of a position. What it must contain is a series
   (not necessarily chronological or logical) of propositions supported by evi-
5 dence and a critically informed position taken by the researcher. This series
   of propositions can be spatially arranged, like paintings in a gallery or
7 pages on a website where it is up to the reader to determine the sequence in
   which the elements are experienced, thereby creating their own narrative —
9 and by implication, argument — of the experience. The critically informed
   position is a matter of development through the material, weighted up by
11 the researcher with a view to find his or her own position in relation to it
   (to the 'existing body of knowledge').
13   The *scholarship* in a digital multi-modal thesis need be no different from
   that in a conventional thesis. There will be references and/or a bibliogra-
15 phy. These can be presented separately as they are in a   conventional social
   sciences thesis, or as footnotes, as is the convention in a humanities thesis.
17 Scholarship will also include a critical and careful examination of the
   problem or the topic analysed.
19   The *portfolio* is the position taken by the university in question   for the
   specific purposes 'of examination and eventual deposit in the   Institute
21 library'. That is to say, the submitted work cannot be a website or a   film or
   an installation per se, but the artefact must be contained with a portfolio
23 (this could be an electronic folder) along with a 'written commentary'. This
   regulation is central to the argument of this chapter because it defines   what
25 is allowed by the university and the format in which the doctoral submis-
   sion must be contained.
27   The relatively conservative positioning of this university is reflected in its
   insistence that there should be 'written commentary on each item of   artistic
29 or technological work and either an extended analysis of one item or a
   dissertation on a related theme' of not more than 40,000 words. The   written
31 commentary on one item could be on the only item contained   in the
   portfolio, if there is not more than one. If there is a collection or series of
33 items — as in a critical catalogue of an exhibition — there needs to be a
   commentary on each item. In addition — not as an alternative — there needs
35 to be an extended (critical) analysis of one item or a dissertation. There is
   thus some degree of choice for the researcher as to what they put in the
37 portfolio. The written element is deemed to take up about half of the full
   submission. Sometimes, the artefact is termed the 'creative' element and
39 the written commentary the 'critical' element, but the distinction   is a
   blurred one. There is no reason why the artefact cannot be critical in its

1   response to an existing context. A fuller discussion of the spectrum of possi-
bilities for the submission and form of a doctoral thesis is contained in
3   Andrews and England (2012). We can imagine at one end of   the spectrum,
the conventional written thesis and at the other end, a thesis that   contains
5   no words at all.

7

UPGRADE AND EXAMINATION

11 Most doctoral degrees — and certainly the MPhil/PhD route —   require the
consideration of an 'upgrade' from MPhil to PhD registration during the
13 course of study. In effect, this often takes the form of an interim 'viva' in
which the student's work is subjected to close perusal by academics other
15 than the supervisor. Some universities also make provision for   an internal
reader to undertake a critical look at the draft thesis before it is submitted.
17 Along with the formal examination at the end of the   process, these
occasions have in common the *critical and formative assessment* of the
19 student's work.
    The experience and imagination which the internal readers and internal
21 and external examiners bring to the process of review is crucial to the suc-
cess and future direction of the student. An examiner or internal reader of
23 work who has digitally submitted (and in which the student brings an iPad
or other tablet to the meeting rather than a printed document) must be sen-
25 sitive not only to the format in which the work is presented but also to the
paradigm in which the student is working. Assuming this to be within the
27 framework of regulations, the research paradigm — how the research is
approached, what values underpin it, what counts as evidence, what place
29 sequentiality plays in the work etc. — is crucial to its appropriate considera-
tion. It follows that either experience, imagination or training is   required
31 for internal readers and examiners who are invited to take part in the doc-
toral degree process. There are thus implications for institutions to make
33 sure such academic staff are properly prepared.
    It is in the management of upgrade and examination, and the wider
35 responsibilities that are bound up with them, that institutions can   take a
leading role in re-thinking the parameters for the doctoral dissertation or
37 thesis. Heads of doctoral or graduate schools have a complex job, often
concerned with applying and interpreting the detailed rules of submission,
39 upgrading and examination. The exciting challenge for institutions, how-
ever, and those with leadership responsibilities in these regards, is how to

1 adapt and update the regulations and guidance to reflect   the changing
nature of knowledge generation and   representation.
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SOME TECHNICAL AND DESIGN ISSUES
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There are some technical issues in the transition from paper-based to digital
9 submission of theses that require brief discussion. Over 100 years of the
printed doctoral thesis (see Borg & Boyd Davis, 2012) has established
11 detailed conventions for submission from institution to institution.   Some of
these look outdated, for example, 'Theses must be presented in a perma-
13 nent and legible form in typescript or print except that mathematical or
similar formulae may be inserted neatly by hand. Photographic and other
15 illustrations should be permanently mounted on A4 size paper and bound
within the thesis. In no circumstances should "Sellotape" or similar   materi-
17 als be used for any purpose' and 'Any material which cannot be bound in
with the text must be placed in a pocket inside or attached to the back
19 cover or in a rigid container similar in format to the   bound thesis.'
Furthermore, illustrative material may be submitted in the following   forms:
21 'a) audio recording [on] compact cassette tape C60 or C90, b) photographic
slides [should be] 35 mm in 2 inch by 2 inch frame.'
23   No such detailed instructions exist for digital formatting and presenta-
tion but they could include something like the following: 'digital submis-
25 sions must be in a format that allows weblinks, and links to other modes
like sound and (moving) image. Three-dimensional phenomena, like   sculp-
27 ture, installations and performance, must be rendered in two-dimensional
form. The submission must give access to the examiners and all   subsequent
29 readers the full experience of the proposed thesis. It should be accompanied
by a printed version which indicates where, and how material that cannot
31 be included in print form, can be accessed'.
In terms of the actual submission of the thesis, candidates must often
33 wait upon the decision of the examiners who will be asked by   the Research
Degrees Examination Officer whether they would prefer to read a hard
35 copy or an electronic copy. 'If the examiners request hard copies, you can
choose to submit your thesis for examination in one of two ways, *either*
37 softbound in medium blue cloth *or* spiral bound with clear plastic covers'.
Again, there is no detailed specification for the electronic   submission,
39 other than 'in pdf format'. This requirement appears to assume that the
material submitted will be static and renderable in the pdf format — as if

1   the digital version were simply an electronic version of the   written, printed
    submission.
3

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                    STORAGE AND DISSEMINATION
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     The regulations, quoted above, stipulate that the portfolio of submitted
9   work must be 'documented or recorded … by means appropriate for the
    purposes of … eventual deposit in the library.' In many cases, in a reverse of
11 the conventional procedure for the submission of a doctoral thesis for exam-
    ination, the digital copy is usually accompanied by a hard copy for backup
13 purposes. Universities which subscribe to the EthOS national   thesis service
    of the British Library (and students of those universities) can access these
15 digital copies of the thesis — via the full text where possible. Currently there
    are about 300,000 records of theses from over 120 institutions, with about   a
17 third available in full text. Of the remaining 200,000, three-quarters are
    available to be scanned. Each month about 3,000 new records are added
19 and about two-thirds of these now provide the full texts of the theses.
    Access is determined by the host institution and may depend on   mandatory
21 electronic deposit of new theses, availability of the theses in the institution's
    own repository and to what extent digitization of print theses is prioritized
23 locally. Doctoral students and others are over 100 times more likely to
    access doctoral theses via this portal than via conventional means.
25   Such digital storage and accessibility means that dissemination   is partly
    on demand. Titles and abstracts are available, as well as full texts — though
27 the abstract is often embedded in the thesis — but so far there is no sys-
    tematic and extensive provision of, say, 10—20-page summaries of theses
29 written for lay or academic audiences that will give a   substantial insight
    into the research that has been undertaken. The closest we have come   to
31 such a service is via agencies and research units which   provide summaries
    for different audiences or the Research Impact summaries that universities
33 have provided for the Research Excellence Framework — which do not
    tend to cover doctoral theses. What this gap suggests is that doctoral stu-
35 dents themselves might wish, in future, to provide 10—20   page summaries
    for their respondents and for interested stakeholders. The public engage-
37 ment agenda is important here, and projects like Catalyst operate at the
    interface of research scholarship and public interest.
39   Most university libraries now house e-repositories for digitized data,
    e-journals, e-books, digitized course readings and doctoral (and   sometimes

1 Masters) theses and dissertations (e.g. http://eprints.ioe.ac.uk). Furthermore, making a digital version of the thesis available enables the metadata to be
3 'harvested' by search engines worldwide, for example, via DART-Europe, the European research libraries e-thesis portal (see www.dart-europe.eu).
5 The online catalogue at my own university library, for   example, has ambitions for a 'discovery layer' to give access to all of this material.   Such
7 a 'layer' would map thematic routes through the material to enable easier access for research students, keying in more to their needs. The key is that
9 digital materials not only enable worldwide access but also   enable better access by users with disabilities and/or learning differences.
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HOW DO THESE CHANGES AFFECT KNOWLEDGE
15 PRODUCTION AND USE?

17 There are at least three aspects of knowledge production and use that are raised by the move to digital/multi-modal theses. One concern is what
19 kinds of knowledge are generated in doctoral work, another is whether research knowledge is upstream or downstream of application and third is
21 the extent to which the users of   knowledge influence (or should influence) the creation and design of the knowledge that is   generated.
23 It could be said that if research operates without an accessible abstract or summary, it often remains unread — as was the case with pre-EthOS
25 and pre-digitization. If the researcher, on embarking on a doctoral course of study, knows that his or her work will be read and that the available
27 resources include all the modes of communication, the project and the knowledge generated will be different.
29 Each of the modes of communication has its own affordances. Verbal language, whether spoken or written, has the possibilities of abstraction,
31 generalization (nouns themselves are thought to be generalizations), logical sequencing, hierarchical categorization. The still image has the   affordances
33 of direct, potentially visceral communication, whether in photographic or painted (digital) form. Words are still the mode via which search engines
35 operate, whereas images (including signs and icons) are increasingly used to represent ideas. Each of these modes may sit in a dominant position
37 to the other: we can imagine an illustrated book on the one hand, where the written word is primary and the illustrations secondary or, on the other
39 hand, a series of photographs where the written word is secondary, as in captions.

1   Both of these major modes of communication are *framed* differently.[2]
     Verbal, written and printed language abides by the medium which carries
3   it: the page and the page on the screen. Currently I am working, in the
     United Kingdom, on an A4 page on computer screen. Because this is (aca-
5   demic) prose, the words wrap around at the end of the line unless I press
     'Enter' for a new line or paragraph. The size of the page changes if the text
7   is moved into a book (very few books are A4 in size) where the framing —
     as manifested in the words and in the design of the pages in the book as a
9   whole — generates expectations as to the content.
        The still image is always more consciously and more evidently framed,
11   even if (or especially if) it is a cropped photograph. The inclusion and pla-
     cing of a photograph in a thesis says something different   from the adjacent
13   written text. It represents a kind of knowledge that is   direct, non-sequential,
     more sensory, observational, of a particular moment. Knowledge   that
15   comes in written form, especially academic writing, is almost   by definition
     abstract, generalized, logical or quasi-logical propositional.
17   The combination of these two modes brings together these two sets of
     affordances: mostly in complementary fashion, sometimes in tension.
19   It is the nature of written academic prose in the doctoral thesis that it
     tends to operate downstream of innovation; in other words, it is post   hoc.
21   Its abstract nature allows it to *reflect back* on practice or   phenomena, seek-
     ing to understand them by the identification of pattern. Once the pattern is
23   identified and transformed into a theory and/or model, it can   be applied
     for future practice and phenomena. But because of the downstream nature
25   of the academic doctoral thesis, many of them remain unread and unused.
     How can advanced research of this kind be brought more upstream of
27   practice and policy? Part of the answer lies in research teams, some of
     whom are engaged in post hoc analysis, and others who are applying   that
29   knowledge to the design of new products and new ways of doing things   —
     and thus creating new communities of knowledge.
31   One further specific implication or unforeseen consequence of the move
     to the digital is obviating of the need for transcription of oral data into
33   writing.

35

37   THE END OF TRANSCRIPTION?

39   While, on the one hand, there has been   interesting and valuable discussion
     in multi-modal circles of the nature of transcription (seeing as one   example

1   of transduction from one mode to another), the practice of transcribing
    from oral recorded data into written transcript must become an increas-
3   ingly rare activity for researchers. First, the oral data are almost always
    recorded digitally. They can be stored in sound files. They can be incorpo-
5   rated into the main body of a thesis and/or into its appendices; even in the
    now outmoded practice of collecting ancillary data on a CD-Rom which is
7   appended to the thesis, sound files can be recorded, stored   digitally and
    presented as part of the thesis as a whole. Transcription is labour-intensive
9   and probably takes up time that could be better spent by the researchers in
    designing research and collecting or analysing data.
11   Transcribing one or two interviews, for example, is always useful. The
    very act of transcription — the transduction from one mode to another —
13   makes one look at the data carefully, seeking patterns that may or may not
    be replicated in subsequent interviews. The inclusion of a full transcript in
15   an appendix — particularly if translation from one language to another is
    involved — provides evidence of the nature of the interview and of tran-
17   scription conventions that have been used. But if the research involves
    moderate or large numbers of interviews or if the data takes the form of
19   sound (e.g. recordings of naturally occurring sound phenomena) then it
    makes sense not to transcribe all the data but to let it 'speak for   itself'.
21   The suggestion that transcription may not be necessary is a simple,
    radical idea that may generate opposition. But it is worth asking: why is
23   transcription necessary? Is the expense in time and/or money worth it?
    Could the research be presented more engagingly by providing direct access
25   to the sound files themselves? The abstraction — literally — the pulling
    away from the core, original data that are involved in transcription   create a
27   distance between the reader and the data: one which may be conventional
    and enjoyed in academia but which may be a practice that is increasingly
29   vestigial. *As long as the analytical function is carried out*, which involves
    standing back from the data so that patterns can be identified, the data
31   itself can be presented more directly. The data can be re-represented   in dif-
    ferent modes if such an action makes them clearer to the author, and to the
33   reader, where the patterns exist and what form they take.
        It is understandable that some researchers may object to the idea   that
35   transcription of every digital sound recording may not be necessary. They
    will argue that analysis must be based on the written transcript, but the
37   argument in the present chapter is that there is more to be gained   in presen-
    tation of the original data, in the mode in which it was generated (and
39   accessible if needed) accompanied by succinct analysis of   its significance,
    than in the laboursome practice of   transcription.

NEW COMMUNITIES OF KNOWLEDGE

Crowdsourcing is one form of collection and generation of   knowledge that may well have further impact on the doctoral thesis. By making the thesis publicly available in digested, summary and full forms, it can be   reviewed, commented upon, answered and be generally open to discussion in a way that was not possible 10 years ago. Although initially used by companies and other organizations to garner collective wisdom, crowdsourcing can   be used as a research tool to generate and refine knowledge on a   particular topic. Wikipedia is one result of such crowdsourcing, but it can be used more interactively to continue a dialogue about newly created knowledge.

The principle behind such interactive approaches to the generation of knowledge is dialogism, indicating a move away from one authoritative voice to a more collective creation of new knowledge. Such a move has implications for the doctoral thesis. As a genre and a rite of   passage, the doctoral thesis tends to be an individualistic project in arts, humanities   and social sciences. It will remain so as the qualification must be awarded to   an individual. More team-based research — for example, involvement in a sys-tematic review of research and/or a research project that involves a range of different types of engagement and outcome — will give scope for an indi-vidual dimension of the group activity to be separated for research degree purposes, as is often the case in the sciences. As expressed elsewhere in this chapter, such doctoral degrees can be factored into the design of research projects at the bidding stage and have to be managed carefully by both   stu-dent and supervisor(s) to make sure that the outcomes are successful for   all concerned.

One further aspect of new communities of knowledge is the facility for summaries of doctoral theses to be accessed by mobile technologies in a variety of media. It is not beyond imagination to conceive of digests of research findings that can be used by practitioners at the point of need: such is already the case in medical and health care; it could be the same in social care, education and other fields where practice needs to be   informed by research. Research thus becomes *upstream* of practice.

PUBLIC ENGAGEMENT

The impact and public engagement agenda is largely concerned   with grant-holding higher education institutions, and more specifically through   an

1   initiative via Research Councils UK. A number of universities across the
     United Kingdom — Aberdeen, Bath, Exeter, the Institute of Education,
3   Nottingham, Queen Mary, Sheffield — have been awarded catalyst funding
     to strengthen the commitment to public engagement, integrate   public
5   engagement into core research activity, support researchers at all levels
     within their institutions to engage and create networks within institutions
7   to support and develop good practice in public engagement. See http://
     www.rcuk.ac.uk/per/Pages/catalysts.
9   To what extent is this movement towards impact and engagement rele-
     vant to and feasible for doctoral researchers?
11   Public engagement generally can take different forms. The approach at
     my own institution is set out at http://www.ioe.ac.uk/research/86369.html
13   where sharing ideas, forming research partnerships, following good practice
     and learning about engagement are four dimensions of the work that is
15   being undertaken to forge a better relationship between research and its use.
         Research briefings of two pages in length (longer than an abstract and
17   more user-focused) are another way in which engagement and impact can
     be fostered. As part of a whole series at http://www.ioe.ac.uk/research/
19   87680.html, two examples are (a) a briefing on a study of the evidence
     available for teaching English as an additional language (EAL) in class-
21   rooms, and particularly at training for teachers in the field, which draws
     mostly on research published in the United States, Australia and the   United
23   Kingdom (http://www.ioe.ac.uk/Research_Expertise/RB18_Strategy_EAL_
     Andrews.pdf) and (b) on the experience of the United States in developing
25   and implementing a National Writing Project for teachers to inform the
     establishment of a similar project in the United Kingdom (http://www.ioe.
27   ac.uk/Research_Expertise/RB25_National_Writing_Project   Andrews.pdf).
         Doctoral research, in arts, humanities and social sciences at least, has
29   been largely individualistic and driven by curiosity of the   researcher rather
     than by any larger social agenda. As noted above, team-based approaches
31   to research which involve doctoral students are rare. As research project
     proposers include studentships within their work, however, the likelihood
33   for a doctoral study to be aligned with a larger research project is becoming
     more common, and thus the possibility for stakeholder input at an early
35   stage in the research design process — for example, setting the research
     question — is growing. The research impact agenda — seen most clearly in
37   the requirement for the 2014 Research Excellence Framework   to provide
     case studies of research that have had an impact on individuals,   institutions
39   or in other ways — is part of this wider picture of public engagement.
     Research impact tends to be seen as one-way; public engagement   in

research is more reciprocal and cyclical in that such engagement can be included at the start of research projects, throughout their development, and again at the end of the project when dissemination and impact are considered.

CONCLUSION

I have argued in this chapter for a shift of practice in the way doctoral theses are conceived, supervised, developed and examined, in response to digitization and multi-modality and also in response to new   practices in storage and dissemination. Such changes do not happen quickly in the university sector, but they can indicate changes in the way knowledge is generated.

In particular, the place of the doctoral thesis in the generation of new knowledge is put into question. If the doctoral thesis continues in   its individualistic way in social sciences, arts and humanities, it is likely to be seen more as a *rite de passage* for the candidate rather than at the cutting edge of new knowledge. For a start, unless a doctoral candidate has undertaken a full systematic research review of the field in which he or she   is working, there can be no guarantee that there is a genuine gap in knowledge being addressed or filled. By definition, individual researchers   cannot undertake full systematic reviews because these require a team effort. It is thus the case — not often acknowledged — that the originality of the doctoral thesis is based more upon it not having been done in exactly this form before (its novelty) rather than on an original conception, design,   dataset or conclusion.

Perhaps the degree of originality is a problematic concept in   itself? Even if an individual researcher, working as part of a research team, identifies his or her contribution as clearly separate from the work of the team as a whole, there are questions about the dividing line between the individual's contribution and that of his/her part in the team.

My argument has been based on changes in the possibilities of new formats of submission and as such is limited to that perspective.   Wider issues, like whether and if so, how the doctorate is used as a career stepping   stone, about knowledge as generated outside the doctoral thesis and outside the academy and intellectual copyright issues that arise from the open and   public availability of doctoral theses — are not addressed in this chapter. On the last issue, the more readily available nature of the doctoral thesis in its

digital form is generally seen by students who are studying, by the candi-
dates themselves and by the wider academic community as a positive
change in public dissemination and engagement. This degree of accessibility
is important not only to fellow research students but also to users in wider
communities in distilled forms like the one-page, two-page and 20-page
summary (and other variations).

From the point of conception of a doctoral research project to the final
points of dissemination, the affordances of new technologies, combined
with an understanding of the multi-modal nature of composition, provide a
challenge and opportunity to further research practice.

IMPLICATIONS FOR POLICY, EDUCATIONAL LEADERSHIP, MANAGEMENT

Finally, what are the implications for policy, educational leadership and
management of the move towards the digital/multi-modal thesis? These are
broad terms, so it is perhaps best to focus on the implications for doctoral
schools and for innovative leadership in the field of research theses.

I would suggest the following:

There will be an increasing integration of research studentships into
funded research projects so that early career researchers can respond to
issues of public engagement and impact at the start of their research
degrees. Early career researchers will learn how their own doctoral research
fits into a larger picture of team-based research as well as into different
communities of practice (including e-communities).

Highly desirable would be a move of research upstream so that it feeds
into the practices and policies that flow from it rather than always addres-
sing the matter 'downstream' or *post facto*/'after the case'. Such a move
would make research more productive in that its results would feed into
learning design rather than attempt to study learning after the event.

All of the above suggests that guidance for students, supervisors and
examiners as to the possibilities afforded by the digital/multi-modal thesis
will need to be reviewed and revised. While not being presented as tem-
plates for future research, a collection of exemplars of theses that have
exploited the possibilities that the digital/multi-modal dimensions would be
very useful for research students. These could be stored on the university
intranets and/or in libraries. The libraries themselves may need to develop
more secure (backup) institutional repositories for digital doctoral theses,

1   as well as national and international collections like EthOS and
DART, so that hard copies are no longer necessary.

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5 <div align="center">NOTES</div>

7   1. Digitization and multi-modality are not synonymous, but the advent   and
wide use of digitization in the early 1990s coincided with the rise of
interest in multi-

9   modality, probably as a result of the birth of the Internet and the more
widespread use of the computer screen.
    2. See   http://multimodalblog.wordpress.com/2013/10/15/framing-as-a-methodo

11   logical-strategy/ (Andrews & Davison, 2013).

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