

Podcasting for Teaching and Learning in Higher Education

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Publication date:
2016

Document Version
Publisher's PDF, also known as Version of record

[Link to publication from Aalborg University](#)

Citation for published version (APA):

Gnaur, D., & Huttel, H. (2016). *Podcasting for Teaching and Learning in Higher Education*. (1. edition - Open Access ed.) Aalborg Universitetsforlag. Higher Education Practices Series No. 2

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Podcasting
for Teaching
and Learning
in Higher Education

Dorina Gnaur
Hans Hüttel

Higher Education
Practices Series

*Podcasting for Teaching and Learning in
Higher Education*

By Dorina Gnaur and Hans Hüttel

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2016

1. Edition, open access

Series:

Higher Education Practices Series, No. 2

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ISBN: 978-87-7112-601-3

ISSN: 2446-1881

Published by:

Aalborg Universitetsforlag

Skjernvej 4A, 2. sal

9220 Aalborg Ø

T 99407140

aauf@forlag.aau.dk

forlag.aau.dk

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Podcasting for Teaching and Learning in Higher Education

Dorina Gnaur
Hans Hüttel

Series Preface

This booklet about podcasting for teaching and learning in higher education has been prepared for inclusion in the Higher Education Practices Series developed by the Higher Education Research Unit in the Department for Learning and Philosophy at Aalborg University. It is part of our mission, to produce timely booklets about research on higher education topics of local and

international importance. This booklet is based on research evidence on how the use of technology in teaching enhances the learning processes – and thereby also the learning outcomes.

The booklet is intended to be a catalyst for systemic improvement and sustainable development in higher education. It is published in paper form as well as being electronically available at <http://www.learninglab.aau.dk/resources/>.

To ensure academic rigour and pedagogical usefulness, each booklet in this series has been reviewed first by the members of the Higher Education Research Unit to provide feedback before being sent for external review. The authors are Associate Professors Dorina Gnaur from the Department of Learning and Philosophy and Hans Hüttel from the Department of Computer Science at Aalborg University. Both have been involved in research projects relating to higher education teaching, specifically involving the use of digital media. Their research interests include aspects concerning University teaching in a PBL environment.

In this series we are mindful that suggestions or guidelines for practice need to be responsive to educational settings and contexts. The booklet is therefore presented in a way that readers can consider the suggestions for their own practices and find suggestions for further reading.

Lone Krogh and Kathrin Otrell-Cass,
Series Editors

”

Tomorrow
belongs to
those who
can hear it
coming.

David Bowie

Introduction

In what follows, we provide an introduction to podcasting in teaching in higher education, to its underpinnings in research and to the practical issues associated with the use of podcasting in this setting.

Teaching with podcasts is a particular form of e-learning and much of the research into the use of podcasts shares the general objective of other forms of research into e-learning: It studies how the use of technology in teaching enhances the learning process and thereby also the learning outcome (Andrews and Haythornthwaite, 2005).

Our basic premise is that the use of podcasts can indeed transform learning in that this approach can be used to educate better and enhance learning. Furthermore, this type of technologically enhanced learning contributes to the integration of 21st century graduate skills (Johnson et al., 2015) as it enhances digital skills, on the one hand, and on the other hand, puts the emphasis on human interaction. The research on educational podcasts has tried to establish what sets the approach apart from other forms of e-learning, to establish what Rosell-Aguilar (2007) calls a “podagogy” and to identify its strengths as well as its shortcomings. In the following, we will explore the practical implications of this for teaching, strengths as well as shortcomings. Throughout the text, we are going to emphasize the connections to the research literature in the area.

We will also devote attention to the practical issues involved for those who consider using podcasts in teaching in higher education. The intended audience of our overview is thus that of educators in higher education. So if you are, say, a university lecturer in the process of preparing a new course or re-designing an existing course and are thinking of using podcasts in your teaching, the following may be of interest to you. No previous knowledge of podcasting is necessary besides basic computer and web experience.

When we speak of ‘podcasts’ in the following, we are referring to recorded content that uses audio or/ and video recording. We will primarily focus on *teacher-produced podcasts*, which are instructional in nature, in that they are content-related and/ or provide process demonstrations. The use and purpose of student-produced podcasts, in which students create content to be used for demonstration, feedback or assessment, will also be touched upon as a point of inspiration.

First, we present what has been reported about the pedagogical benefits of integrating podcasts in teaching and outline some of the underpinning educational theory. Next, we focus on practical matters, including the implications and challenges with producing podcasts in terms of academic efficiency as compared to lectures. There is a wide variety of technological solutions available, and we will present a discussion about some of these tools and their

use and usefulness. A particular concern is copyright; we will therefore describe how to deal with it, and finally we discuss some of the typical pitfalls.

What are Podcasts?

Definition, background and use

The term *podcast* first appeared in a newspaper article from The Guardian from 2004 (Hammerley, 2004). The word itself is an amalgam of *iPod* and *broadcast*. Nowadays, the term is used to describe any type of recorded audio or video content made accessible to a larger audience and stored on personal or portable devices for (offline) discretionary use. Most often podcasts are offered in the form of syndication, either in the form of RSS feeds, or via automatic, regular download (using software such as iTunes).

The idea of educational podcasts dates back to 2004. That autumn Duke University in the United States distributed 20 iPods to students and used them in 15 courses for podcasting. The following semester, the number of courses using podcasts had increased to 33. Foreign-language and music courses made use of podcasts, and all first-year engineering students used audio podcasts for a compulsory course on computational methods (Center for Instructional Technology, 2005). Three years later, video podcasting was a reality and was being introduced at universities across the United States. Around the same time, educational researcher became interested in the pedagogical aspects of podcasting.

In this overview we will consider the following four kinds of using podcasts in teaching (Kay, 2012):

1. *Lecture-based or substitutional podcasts* are recordings of lecture content that students can access before, after, or instead of a face-to-face lecture.
2. *Enhanced presentation podcasts* refer to presentation material (in the form of handwritten presentations or slides created with e.g. PowerPoint) with voice-over, i.e. an audio explanation and the movements of the pointer or stylus on each slide.
3. *Supplementary podcasts* support the teaching and learning of a course by offering additional resources including real world examples, summaries of classes or textbook chapters, learning to learn or any other input to inform student learning.
4. *Worked examples* are particularly tailored to provide video explanations of specific problems or applications for which students need guidance.

In addition to teacher-developed podcasts, teaching can involve student-produced podcasts as a means for students to provide course-related input to the teacher or to their fellow students.

(Pelet, 2013) identifies three main teaching and learning approaches that involve podcasts, namely *receptive viewing*, *problem solving* and *creative use of podcasts*.

Receptive viewing covers the first three ways of delivering content mentioned above, and is by far the most common use of educational podcast, i.e. to present information for the student to process in their own time in a relatively passive manner.

The problem solving approach corresponds to the worked example format, and just as for receptive viewing, the intent is to present information to the learner but with a more specific learning objective related to the demonstration of how to solve particular exercises and problems. Objectives of this kind are particularly important in science and engineering (Pelet, 2013).

Creative use of podcasts is, like receptive viewing, a wider category in which the creation of podcasts is a learning strategy used to encourage students to investigate, collaborate or present their learning for evaluation.

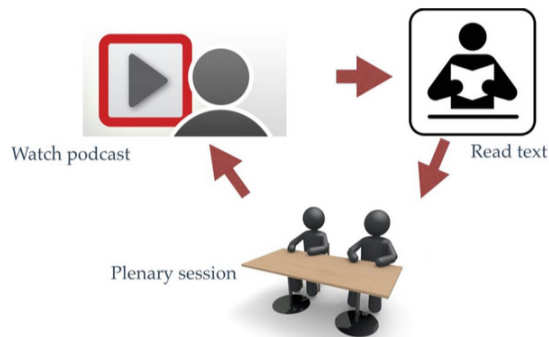


Figure 1: The flipped cycle

In our discussion, we focus on teacher-developed educational podcasts. We aim to provide a synthesis of the best practice for using podcast technology for students. Here we pay particular attention to the challenge of using podcasts to provide the basic content and procedures in such a way that class time can be used to process and integrate knowledge, skills and competences at higher taxonomic levels than would otherwise be possible (Figure 1).

This way of using podcasts is sometimes referred to as *the flipped classroom*, and it has received a lot of attention as an element in raising the quality of teaching and learning in education.

The flipped classroom is a particular version of the receptive viewing approach: In the flipped approach, the material is carefully targeted and presented to students in the form of podcasts that they can watch on their own. Instead, the time spent together in plenary sessions is devoted to activities that can create new and rich learning opportunities. This turns the traditional workflow of teaching with plenary lectures and practice-as-homework upside-down, thus the name. The flipped approach also originates in the United States; the underlying pedagogical idea dates back to (King, 1993), namely that a teacher should not be a “transmitter of content” but rather be a facilitator. The connection between this insight and the use of technology dates back to the work by Lage, Platt and Treglia (2000) and got its name in (Baker, 2000). We shall return to

the pedagogical rationale behind “flipping” and the use of podcasts in general in the next sections.

Suggested reading

- King, A. (1993). From Sage on the Stage to Guide on the Side. *College Teaching*, 41(1), 30-35.
- Lage, M.J, Platt, G. J. & Treglia, M. (2000). Inverting the Classroom: A Gateway to Creating an Inclusive Learning Environment. *The Journal of Economic Education*, 31(1), 30-43.
- Pelet, J.-E. (2013). *E-Learning 2.0 Technologies and Web Applications in Higher Education*, Advances in Higher Education and Professional Development: Premier reference source, IGI Global.

Why use podcasts?

Podcasts and the foundations in theories of learning

The idea of podcast-based teaching grew out of teaching practice, not as a particular consequence of theories of learning. Researchers have since devoted their attention to understanding the approach in the light of theories of learning, and there are a number of theories of learning that can support the use of podcasting (Rosell-Aguilar, 2007).

Podcast-based teaching is one of many student-centered approaches, and like other such approaches its theoretical justifications look to *constructivism* and in particular to the work of Piaget and Vygotsky – see e.g. Bishop and Verleger

(2013). The central idea is that students can construct their own knowledge structures through interaction with the digital environment offered by the use of podcasts.

Mathiasen (2010) and Jahnke (2015) are among the researchers that also trace the entire idea of “digital didactics” and its focus on a student-centered approach to learning back to the *systems-oriented thinking* of Luhmann. A consequence of this view is that the student and the digital teaching environment are separate systems that are operatively closed. By this we mean that each of these systems is capable of internal communication but that there is no transfer of knowledge between the systems. Therefore, knowledge is not a “substance” that the teacher can transfer directly to the learner by means of, say, lecturing or podcasts. Instead, knowledge is constructed *indirectly* within the learner by means of processing input from teaching activities. From this systemic perspective on constructivism, we can think of the construction of knowledge as the process of increasing inner complexity that is, the individual student, in the meeting with external complexity. As a result, this will lead to better knowledge construction processes within the student. The more stimulating the teaching/learning environment, is, the more scope there will be for students to qualify their own learning.

Finally, podcasting also shares characteristics with the more recent notion of *mobile learning* (Kukulska-Hulme, 2005). Mobile learning can

be understood as the kind of learning that takes place when the learner is not at some fixed location known in advance, and can also be understood as a kind of learning in which the learner makes use of the opportunities for learning offered by mobile technologies – that the teaching environment is mobile.

Suggested reading

- Bishop, J. L., and Verleger, M. A. (2013). *The flipped classroom: A survey of the research*. Paper presented at the American Society for Engineering Education, Atlanta, GA.
- Jahnke, I. (2015) *Digital Didactical Designs: Teaching and Learning in CrossAction Spaces*. Routledge, London.
- Kukulska-Hulme, A. (2005). Introduction. In A. Kukulska-Hulme & J. Traxler (Eds), *Mobile learning: A handbook for educators and trainers*. London: Routledge.

Deep learning vs. surface learning – and strategic learning

A particular advantage of using podcasts and in particular when this is done as part of a flipped approach is that one can now design the plenary teaching activities to better accommodate *deep learning*. Marton and Säljö (1976) were the first to distinguish between deep learning and surface learning. These are not learning styles but correspond to two different strategies that students use (consciously or not) when they think about learning.

Surface learning is the kind of learning that sees learning as being the task of being able to reproduce. A surface learner will try to learn how to reproduce the signs (the terminology, the notation, the methods etc.) but will not focus on what the signs actually mean. As a consequence, the surface learning will most often not be able to use the signs in an unfamiliar context. Moreover, surface learning sees the learning process as being first and foremost a form of memorization.

Deep learning is a very different kind of learning – a deep learner learns first and foremost in order to understand. A deep learner learns what the signs “really mean”. As educators, we should want our teaching to help the students approach the topics by means of deep learning.

It has long been known (Bligh, 1972) that traditional lectures as a main teaching activity tend to reward passivity among students and are not conducive to deep learning.

Studies in student learning patterns have identified a third parameter related to the quality of learning, namely that of students focusing on achievement itself. This has been named *strategic learning* (Entwistle, 2001) describes a highly performance-driven attitude by learners who aim at achieving high grades. A particular challenge arises when students associate strategic learning with surface approaches to studying just to pass an exam while exerting as little effort as possible (Biggs, 1987). This goal may be achieved, but the benefits are short-lived. It is therefore

important to design teaching activities in such a way that the strategic learners will also become deep learners.

Flexible learning

When podcasts are used as part of teaching, learners will get more room for manoeuvre when it comes to planning their use of presentations. Unlike a traditional lecture, a podcast can be viewed in many different ways, at many different times and more than once. This flexibility is a key consideration in designing for learning. Collis and Moonen (2002) define flexible learning as a movement away from a situation in which key decisions about learning are made in advance by the instructor or institution, towards a situation where the learner has a range of options from which to choose with respect to these key dimensions.

However, when seen in the perspective of strategic learning, the flexibility that comes with the use of podcasts can support both deep and more superficial approaches to learning. The underlying pedagogical design is therefore crucial to whether podcasts will in fact support deep learning. It depends essentially on the extent to which podcasts are used to propel learning to higher taxonomic levels.

Recent results by Koedinger et al. (2015) reveal that presentations themselves – even when they are podcasts – are not conducive to deep learning. In a study of 28,000 students following

Coursera courses, the students that only watched podcasts and did not participate in other activities were the ones that were least likely to pass the quizzes used as assessment throughout the course. The students that did best in this respect, were the ones that participated regularly in interactive teaching sessions. In other words: the use of podcasts is not a solution *in itself* but must go hand in hand with active learning strategies. As we argue in this overview podcasts have as their strength that they can be used to *reposition* the role of presentations in the overall design of teaching activities.

Signature pedagogies and threshold concepts

In the pedagogical design of a teaching activity there are two notions that are particularly important. *Signature pedagogies* (Shulman, 2005) are the characteristic forms of teaching and learning associated with particular professions. They define what counts as knowledge in a field and how things become known. For instance, it is still common to teach mathematics at university level using a chalk-and-blackboard-based approach.

In order for podcasts to succeed in effectively conveying the content and simple procedures, etc., it is important that they are framed in ways that are recognizable to the disciplinary field. At the same time, podcasts offer an opportunity to revisit and reframe the usual ways of conveying and producing knowledge, which may in itself

stimulate learning in the disciplines. In this way, podcasts can both support and transcend the signature pedagogies of a subject.

Research by Land et al. (2006) has identified that for students, their advancement within a field goes through some narrow passages where they tend to encounter difficulties in grasping certain specific concepts that are central to a discipline. Many teachers will know of concepts or topics that are particularly difficult, but also completely essential to “mastering a subject”, that is, to meeting the learning goals of the teaching activity: “If you cannot explain or apply X, then you cannot claim to have understood linear algebra” (for example). These narrow passages are what Land et al. (2006) call *threshold concepts*. When you plan a teaching activity – and this goes for all activities, no matter if podcasts are involved or not – you need to be aware of what constitutes threshold concepts for the students and how your activity is going to help the learners cross the threshold.

Sometimes signature pedagogies can support threshold concepts directly. For instance, the chalk-and-blackboard approach to mathematics can be used to emphasize the importance of certain forms of mathematical reasoning. If we use podcasts to present content and model/demonstrate procedural knowledge, this can create new ways in which the student can approach the subject matter, as well as new ways of creating a dialogue between students and teachers. This

can be particularly valuable when the goal of the teaching is to identify where the thresholds are and how students can cross them. In other words: if podcasts are used, students can get more as well as more flexible opportunities to process new and unfamiliar matters topics. And since the time spent together is now no longer devoted to presentations, the teacher can instead devote more attention to the particular learning needs of the students and the quality of the overall learning in the plenary session.

Technology-enhanced teaching and the academic dilemma of dual efficiency: research and teaching

Academics are often torn between competing pressures for research excellence and teaching professionalism (Clegg, 2003). Some speak of two academic tribes – those who prioritize research within their career, and those who tend to prioritize teaching (Ramsden, 1998). The use of technology in teaching cannot in itself deal with this divide, but it has the potential to release part of the workload that is associated with traditional teacher-led presentations (such as lectures) and instead put the emphasis on more student-centric learning situations that lie closer to the research end of disciplinary knowledge.

From a purely pragmatic point of view an advantage of using podcasts is that they can often be re-used; the effort into planning and producing podcasts will pay off as more time

being available where one would otherwise be lecturing. Moreover, once a suitably large body of podcast material is available, teachers can share the material and think of presentations as a joint resource. In particular, it is useful to think of podcasts as small video-based content units that can be easily updated and re-used in various contexts.

The teaching academic should also think carefully about the various forms of knowledge that presentations can be used to convey. Very often the kind of knowledge that can be transmitted efficiently in a presentation (be it a lecture or a podcast) is of a *declarative* nature. This is knowledge about things, or “knowing what”, and is the kind of knowledge that can be “declared” in a presentation.

On the other hand, more evolved skills and competencies are best dealt with in a student-centric learning situation in the form of activities that are related to critical knowledge aspects (cf. threshold concepts), problem solving, and the generation of ideas and new knowledge. In these settings, podcasts can also be an important tool, only this time in the form of student-produced podcasts or similar technologies that can be used to document student learning (Pacansky-Brock, 2013).

Designing, producing and integrating educational podcasts

We now present a theoretical framework that was developed to unpack the relationship between technology and teaching and learning. It is called The Technological, Pedagogical, Content Knowledge (TPACK). Then we present a particular approach to using podcasts, the so-called e-tivities. And finally we introduce a conceptual model for academic podcast production. This is the so-called “*10-Factor podcast development model*” (Salmon & Edirisingha, 2008).

Models of using technology in teaching

The TPACK model developed by Mishra and Koehler (2006) is meant as a framework for understanding and describing the kinds of knowledge that a teacher will need for effective pedagogical practice in a learning environment that uses technology as part of the teaching. As the name indicates, it identifies how the three kinds of knowledge of pedagogy, content and technology and their interplay are to be understood in this kind of environment. Figure 2 explains how these three forms of knowledge intersect: Knowledge of *pedagogy* is needed to understand learning issues. Knowledge of the *content* that is to be taught is necessary, and knowledge of the *technology* that can be employed in teaching is necessary. These three forms of knowledge are related, and their intersection is the compe-

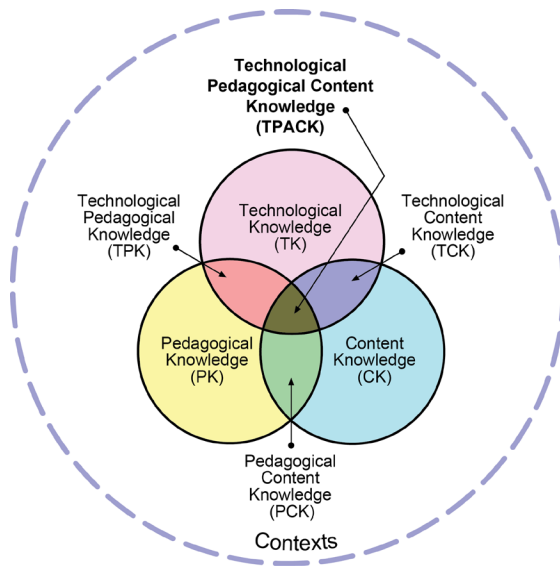


Figure 2: The TPACK model reproduced by permission of the publisher, © 2012 by tpack.org

tence necessary in order to use technology when teaching a subject (Figure 2).

The TPACK model provides a general account of how to use technology in teaching. Another point of view that is specific to teaching with podcasts is what Salmon (2002) refers to as *activities*. These are activities that generally involve the teacher providing an online prompt or “spark”; this involves some instruction related to a piece of information, stimulus or challenge. The instruction might either conclude the content recorded in the podcast or supplement the unit as an independent activity podcast. The learners then act as advised, which might imply

some digital production and/ or taking part in a moderated on-line activity (say, a discussion) that requires them to respond in some way to the ‘spark’. In general, the learner must provide an individual response (that could be an audio/video production), and then comment on or contribute to the responses made by other learners. A summary, feedback or constructive critique is then provided; this is often done by the teacher (i.e. moderator), but sometimes this may be the task of the learners themselves.

A 10-factor model of developing podcasts for higher education

The 10-Factor podcast development model, shown in Figure 3 (next page), was developed as part of a larger project (Salmon and Edirisingha, 2008) that has sought to explore the learning impact of podcasting on student learning. The model provides recommendations and guidelines for integrating podcasting into discipline-specific contexts and within the e-learning strategies of an institution. According to the authors, the 10 factors of the model contains the necessary prompts that need to be answered before and while podcasts are developed and the choices that need to be made. Any such endeavour necessarily starts with the pedagogic consideration of why and how podcasts can help in this particular setting.

The pedagogic rationale (1) will in itself have implications for the further design of the teaching and learning situation with podcasts. That is,

Factor:	Options:
1. Pedagogical Rationale	Limitation of lectures: complex topics/ concepts Need for effective tutorials, e.g. software tools Location-based learning (in the field) Effective & attractive learning resources
2. Medium	Audio; video; voice-over; pencasts; animations;
3. Convergence	Integrated with other learning resources; VLE
4. AuthorsS & Contributors	Lecturer, -s / and / or students; learning specialist ? learning technologist ?
5. Structure of Podcasts	Single session? Multiple sessions (e.g. weekly) Targeted for specific purposes (exam, assessment)
6. Reusability	Temporary / Reusable; cf. Academic efficiency
7. Lenght	Ideally about 10 minutes
8. Style	Genre; Informal, interesting, engaging
9. Framework	Inform & motivate – expand – wrap-up
10. Access System	RSS-feeds; existing VLE

Figure 3. The 10- Factor podcast development model for academic podcasting [7]

the teaching and learning issues will determine the approach to using podcasts (e.g. instructional video, pre-lecture introduction to difficult concepts) and a strategy for supporting student learning, such as active learning. For further discussion of various types of pedagogical rationale in connection with the use of podcasts, we refer to Salmon and Edirisingha (2008).

The other factors in the 10-factor model that we wish to draw particular attention to are those of

structure (5), reusability (6) and framework (9). If one wants to create variation and to address multiple teaching and learning purposes, one should keep in mind what we have mentioned earlier: That podcasts can be used for various purposes – as substitutes for lectures, enhanced presentations, and supplementary material or as worked examples.

As also mentioned earlier, reusability is an important parameter when it comes to academic

efficiency. It can be time-consuming, at least in the beginning, to produce and plan for an integrated teaching and learning design involving podcasts, so we recommend that one gives priority to how one expects to re-use the material that is being developed.

Finally, regarding the framework, one must keep in mind that each podcast must constitute an instructional/ informational unit. In other words, a podcast should be reasonably self-contained and to-the-point. Within a short span of time – about 10 minutes – the podcast should include a motivational opening and a presentation of what the podcast is about, the unfolding of the content, a conclusion and what will come next (Stacey and Gerbic, 2009).

Suggested reading

- Biggs, J. (1987). *Student Approaches to Learning and Studying*. Melbourne: Australian Council for Educational Research.
- Biggs, J. (2003) *Teaching for Quality Learning at University*. Second Edition, Open University Press, Maidenhead.
- Bligh, D.A. (1972). *What's The Use of Lectures?*, Harmondsworth: Penguin.
- Clegg, S. (2003). Problematising ourselves: Continuing professional development in Higher Education. *International Journal of Academic Development*, 8,(1/2), 37-50.
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- Pacansky-Brock, M. (2013). *Best Practices for Teaching with Emerging Technologies*, <http://teachingwithemergingtech.com/>, London: Routledge.
- Ramsden, P. (1998). *Learning to lead in higher education*, London: Routledge.
- Salmon, G. (2002) *E-tivities: a key to active online learning*. London: Routledge.
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- Shulman, L. (2005). Signature pedagogies in the professions. *Daedalus*, 134 (Summer), 52-59.
- Stacey, E. & Gerbic, P. (2009.) *Effective Blended Learning Practices: Evidence-Based Perspectives in ICT-Facilitated Education*, IGI Global.
- tpack.org (2015). <http://tpack.org>.

Podcasts made by students

Podcasts can also be created by students, and this approach appears to be particularly popular in the setting of teaching activities that introduce students to practice-related aspects of their subject (Heilesen, 2010)

One should distinguish between two ways of using student created podcasts, namely as *feedback* or as *assessment*.

When students are involved in designing and recording a podcast as feedback in a teaching activity, this can encourage them to obtain advice from their tutors and to listen to and capture the views and experiences of their peers. Moreover, student-produced podcasts have the potential to make forms of knowledge that tend to be thought of as *tacit knowledge* explicit (Salmon and Edirisingha, 2008). These podcasts can then be re-used and made available to a wider group of students. By tacit knowledge we mean knowledge that resides in individuals' experience and actions. This "unspoken" form of knowledge is notoriously difficult to transfer from one person to another, and also difficult to assess unless made explicit (Shin, Holden and Schmidt, 2001).

There is also growing interest in the use of telling stories via the use of digital devices. Murray and Sandars (2007) report how storytelling podcasts can be used successfully to engage medical students in reflection on learning and professional practice. Jenkins and Lynch (2006)

describe an experiment in using digital storytelling for first-year students at the University of Gloucestershire.

In the setting of assessment, Downward, Livingstone, Lynch and Taylor (2007) describe a way of using student-developed video podcasts based on field trips instead of text-based field trip reports. Yannotta and Lym (2011) report on how podcasts can be used in the assessment of a course on information literacy; by requiring the students to produce podcasts about their information search strategies, the teachers use these podcasts to assess how students actually search for information. Podcasts as assessment have been studied in a Danish context by Grønning (2011) in relation to her podcast integrated teaching at the University of South Denmark, based on Salmon's notion of e-tivities.

Suggested reading

- Grønning, A. (2011). E-tiviteter som eksamensform. *Læring og Medier*.
- Heilesen, S.B. (2010). What is the academic efficacy of podcasting? *Computers & Education*, 55, 1063–1068.
- Yanotta, L. & Lym, B. (2011). Put the Pencil Down: Using Student Podcasts to Assess Learning in a For-Credit Research Course. *Association of College and Research Libraries*. http://www.ala.org/acrl/sites/ala.org.acrl/files/content/conferences/confsandpreconfs/national/2011/papers/put_the_pencil_down.pdf.

Making a podcast

We will now introduce some practical issues that arise when making a podcast production. Here it is important to remember that this is a rapidly changing field because the technology keeps evolving. The book by Pacansky-Brock (2013) contains a collection of useful hints about different aspects in podcast production. Further useful information about the production of instructional videos can be found on the Khan Academy website (Khan Academy, 2015).

In our experience, it is important to choose technology that can be used with a wide variety of platforms for viewing/listening to content. Most podcasts can be rendered in a widely supported playback format such as MP3 (for audio), MP4 (for video) or Quicktime.

Preparing a podcast

Preparing a podcast will require thorough preparation on the part of the teacher. If one is making the transition from lectures based on presentations with slides to podcasts, the existing slides may be a good initial manuscript that one can use for further preparation. A similar starting point is possible if one is going from a blackboard-based approach to lectures and lecture notes from the lectures are available. In all other cases, one will have to prepare a manuscript, possibly in combination with a storyboard – a series of pictures (often drawings) that outline how and in which order illustrations are to appear in the podcast.

Different forms of podcasts

There are a number of different approaches to digital podcast content. These different content formats can be used to support different signature pedagogies. We will describe selected “pure” formats, but these can of course be combined. For instance, one can produce a podcast that is part pencast, part screencast. Pacansky-Brock (2013) has a thorough review of various kinds of software and how to use them in practice. We here concentrate on three kinds of podcast content.

Pencasts

A pencast is a form of video material that uses a combination of handwriting and voice-over; this form relates to signature pedagogies that involve blackboard-style presentations.

The term pencast originates with the LiveScribe smartpen (LiveScribe, 2015). The content can be saved as annotated PDF files or exported as pencasts that can be embedded into HTML. The advantage of using this particular type of smartpen is that its look and feel is similar to that of an ordinary (somewhat large) pen. The content is written on paper and is as such simply a collection of notes. However, the data format is not editable. Moreover, the embeddable pencasts reside at the LiveScribe server, so the actual ownership of a pencast in this format is unclear and the availability of the pencast depends on the availability of the LiveScribe server.

An alternative is to use a tablet computer, a stylus and a microphone together with a special app for recording presentations. In our experience, an app should have a so-called *wristguard*. This is a special software feature that will render a part of the touchscreen insensitive to input and thereby allow the user to rest his/her hand on the touchscreen while writing, just like one would need to do when writing on paper. Moreover, it is important that the app can export the recording to an editable file format such as Quicktime (with file extension .mov).

Doceri (2015) and Explain Everything (2015) are two such apps. Doceri is available for Windows tablets and iPad and also makes it possible to record and annotate lectures. Explain Everything (2015) is available for Windows, iPad and Android and makes it possible to combine hand-written parts, video recordings using the built-in camera and keyboard input from the tablet.

Editing video content

There are several software solutions available for editing video content. Windows now comes with the free MovieMaker application, and similarly Mac OS X has the freely available iMovie application. An open source alternative that works for Windows, OS X and also for GNU/Linux is Blender (2015). It is also possible to do simple editing directly in YouTube. This can be convenient if one chooses to store a video production here.

These video editors tend to have somewhat similar user interfaces with a notion of timeline for structuring the editable video project – this is the case for all the applications mentioned above. No matter what kind of software one wants to use, it is important to ensure that the program allows for exporting content in a suitable format and of suitable quality; in particular there is a trade-off between file size and picture quality. Some editing software allows the user to export directly to YouTube (see above).

In our experience, users often tend to polish their presentations excessively during the process of editing. Other users spend less time on editing but instead keep re-recording large portions of their material in order to achieve a “perfect fit”. In both cases, latent perfection has taken over – in our opinion, this is to be avoided.

Screencasts/slidescasts

A screencast is a form of video material that consists of a presentation that is meant to be shown on a screen together with a voice-over; this form relates to signature pedagogies that involve the use of computer-presented slides (this a slidescast) or demonstrations of interaction with a computer.

There are options for recording slidescasts in both Microsoft PowerPoint and Apple Keynote. In PowerPoint one can attach separate audio content to each slide, while Keynote allows for recording full presentations (that is, the audio content belongs to the entire presentation). If one

uses OpenOffice, one can export the content to SlideShare (SlideShare, 2015) and then attach an audio file to the finished presentation.

A more advanced piece of screencasting software, which enables an add-in to run the program from within PowerPoint is TechSmith Camtasia Studio (Camtasia, 2015). Camtasia allows the user a wide variety of options: to record on-screen activity and PowerPoint slides, to add imported media (graphics, audio, and video), to edit video content and to publish the result to the web. Since Camtasia Studio is also editing software, it can therefore be used in conjunction with the other podcast formats that we have mentioned above. Camtasia Studio has excellent support tutorials, and users can share their content at no cost using Screencast.com. At the time of writing, Camtasia can be downloaded as a one-month free trial version, after which a licence is necessary.

Suggested reading

Pacansky-Brock, M. (2013). *Best Practices for Teaching with Emerging Technologies*, <http://teachingwithemergingtech.com/>, London: Routledge.

Distributing a podcast

There are several ways of distributing podcasts.

Sharing via RSS feeds

RSS stands for Rich Site Summary (but often gets called Really Simple Syndication) and is widely used for publishing content that gets frequently updated: blog entries, news headlines, and podcasts. An RSS document is an XML file, called a *feed*, that includes full or summarized text, and metadata, such as the publishing date and the name of the authors. To distribute a podcast in this way, one must create the media files and the RSS feed and keep these together on a web server.

An RSS feed can be created by end user software but there are also several web services that allow you to create RSS feeds. A good overview of both the options and the workflow needed to create a feed can be found at WikiHow (2015).

When an RSS feed has been created, the next step is to publish it. It is quite common to submit a podcast feed for inclusion in the iTunes Store podcast directory kept by Apple in its iTunes Store. Apple has an FAQ aimed at podcast makers (Apple, 2015) that describes how this is done. Note that *Apple does not host the podcasts*; this remains the responsibility of the podcast maker.

Sharing by other means

One can also share video content via video streaming services, of which YouTube is by far the best known, or by the SlideShare service for sharing slide-based presentation. While this way

of sharing content does not constitute podcasts as we have defined the term, the style of communication is intimately related to what we have discussed earlier and is easy to distribute. An issue to have in mind is that fora such as YouTube and SlideShare have copyright regulations. YouTube lets users mark their videos with a Creative Commons CC BY licence (Creative Commons, 2015). With this particular licence, users are then free to share and use the material for any purpose, even commercially, as long as appropriate credit is given. This implies that video content under this particular licence are accessible to YouTube users for use in their own videos.

Suggested reading

Apple (2015). *For Podcast Makers: Frequently Asked Questions*. Retrieved from <https://www.apple.com/itunes/podcasts/creatorfaq.html>.

Creative Commons (2015). <http://creativecommons.org>.

WikiHow (2015). *How to create an RSS feed*. Retrieved from <http://www.wikihow.com/Create-an-RSS-Feed..>

Copyright and privacy issues

Most educators are employed at an institution and it is important to sort out to whom the copyright of the material produced belongs.

In some cases, the copyright rests with the institution. In the following, we will focus on Danish legislation. The rights associated with com-

puter software developed by employees as part of their job rest with the institution (The Danish Copyright Act, §59) and so do the rights of video and audio recordings and databases made by employees as part of their job (§66-60 and 71). *However*, in the case of other kinds of teaching material, including texts, drawings, graphics, photographs, pictures, music slides and video content that imply creativity on the part of the creator, the rights to the material belong to the creator unless another agreement exists between the teacher and the institution. If there is no such agreement, the institution can only make use of the material in ways that are necessary for its ordinary activities at the time the material was created. See (Rosenmeier, 2015).

So, in general the content ownership rests with the person that created the podcast. In these cases, the Creative Commons licences allow for great flexibility as to how others are allowed to distribute and modify the content and how content is to be credited. When student podcasts are concerned, it is important to be have an agreement with students about the ownership issues before asking them to create podcasts.

Suggested reading

Rosenmeier, M. (2015). *Hvem har ophavsretten til undervisningsmaterialet, underviserne eller institutionerne?* <http://ubva.dk/Ophavsret-til-undervisningsmateriale>

Creative Commons (2015) <http://creativecommons.org>.

Pitfalls and challenges

The idea of using podcasts in teaching is becoming more and more popular. Here are some of the pitfalls we read about and those have come across based on our own experiences (Gnaur & Hüttel, 2014; Gnaur & Clausen, 2015):

- Studies indicate that students can feel that they have less interaction with their teacher compared to “traditional” teaching (Gnaur and Hüttel, 2014)
- It is tempting for teachers to develop a perfectionist attitude towards video material which regularly turns out to be time consuming to create and edit video content compared to more traditional presentations (such as lectures).
- If one invests a lot of effort in developing video material it can be tempting to leave it unchanged and recycle it, year after year, because the efforts needed to update the material may seem daunting.
- The video material may repeat some of the trappings of traditional styles of presentation.

There is no simple or universal solution to these challenges. What is important is that one is aware of the issues involved and to design the teaching activities so as to address them explicitly.

Suggested reading

Gnaur, D. & Hüttel, H. (2014). How A Flipped Learning Environment Affects Learning In A

Course On Theoretical Computer Science. In *Advances in Web-Based Learning - ICWL 2014 - Lecture Notes in Computer Science* vol. 8613 Springer Publishing Company, 219-228.

Gnaur, D. and Clausen, J. (2015). Teaching smart with podcasts. In: *International Journal of Engineering Education*, 31,(2), 486-494.

An overview of design considerations for podcasting

In the previous sections we have provided a synthesis of existing work on using podcasts in teaching in the setting of higher education seen in the light of theories of learning. The use of podcasts draws, like other forms of e-learning, heavily on ideas from constructivist learning theories.

The discipline and nature of content and learning goals are factors that should shape the use of podcasts. The notion of *signature pedagogy* provides a way of shaping a technology-enhanced approach to teaching based on the approach taken by the subject that is to be taught. Moreover, the podcasts should help students accommodate *threshold concepts* of the subject if learning is to be successful.

There are by now a number of practice-oriented models of understanding the relationship between technology, content and pedagogy. When developing podcast-based teaching, it is beneficial to use such frameworks from the outset in

order to ensure good outcomes for teaching and learning in higher education.

The introduction and use of needs follow the same pedagogical decision making as any teaching approach would. The TPACK model (tpack, 2015) tells us that pedagogical knowledge remains important when technology is introduced; the podcast-based approach should support different learning styles and approaches by the same underlying principle as for any other teaching activity.

The following design principles for *flipped classroom* activities are adapted from Bell et al. (2014) who in turn base themselves on insights from Kim et al. (2014). Many of these principles are not exclusive to the flipped setting, as one will discover. In a setting where podcasts are not the only means of presentation but are used for, say, worked examples that supplement lectures, the design principles concerning in-class and out-of-class activities will not be any less important (See the tables on pages 24 and 25).

Suggested reading

Bell, A., Bridgeman, A., Couch, R., Dalton, H., Hendry, G., Liu, D., Pardo, A., Scou s, M. & Ward, M.-H. (2014). Flipped classes. *Teaching Insights 9*, University of Sydney. https://sydney.edu.au/education-portfolio/ei/programs/teaching_insights/pdf/insight9_flipped_classrooms.pdf.

Kim, M. K., Kim, S. M., Khera, O., & Getman, J. (2014). The experience of three flipped classrooms in an urban university: an exploration of design principles. *The Internet and Higher Education*, 22, 37-50.50.

Conclusion and perspectives

When introducing podcasts it is, as for any other use of technology in teaching, important to reflect upon how the interplay between technology, content and pedagogy can best facilitate the learning. There is a wealth of software and hardware available for producing and distributing podcasts, and we described some of this. However, the use of technology is of course not a solution *in itself*. The use of podcasts allows teachers to *shift the focus of their teaching away from that of presenting material* and to put more emphasis (or less emphasis!) on certain aspects of a teaching activity and to re-think your use of in-class time.

One must be aware that podcasts only play a role in an overall pedagogical design, as a part of an overarching pedagogy and are not the pedagogy as such. If used to support students' preparation, it allows teachers to capitalize on opportunities for integrating and applying knowledge, through student-centered, active learning strategies and to provide individual support to deepen understanding and help students develop procedural fluency.

We have focused on the *flipped classroom*, since this is an important instance of the general notion of refocusing teaching on active student involvement in order to process and integrate higher order knowledge rather than merely transmitting information. However, *any* form of teaching that involves presentational activi-

ties and activities intended to encourage active learning can be flipped.

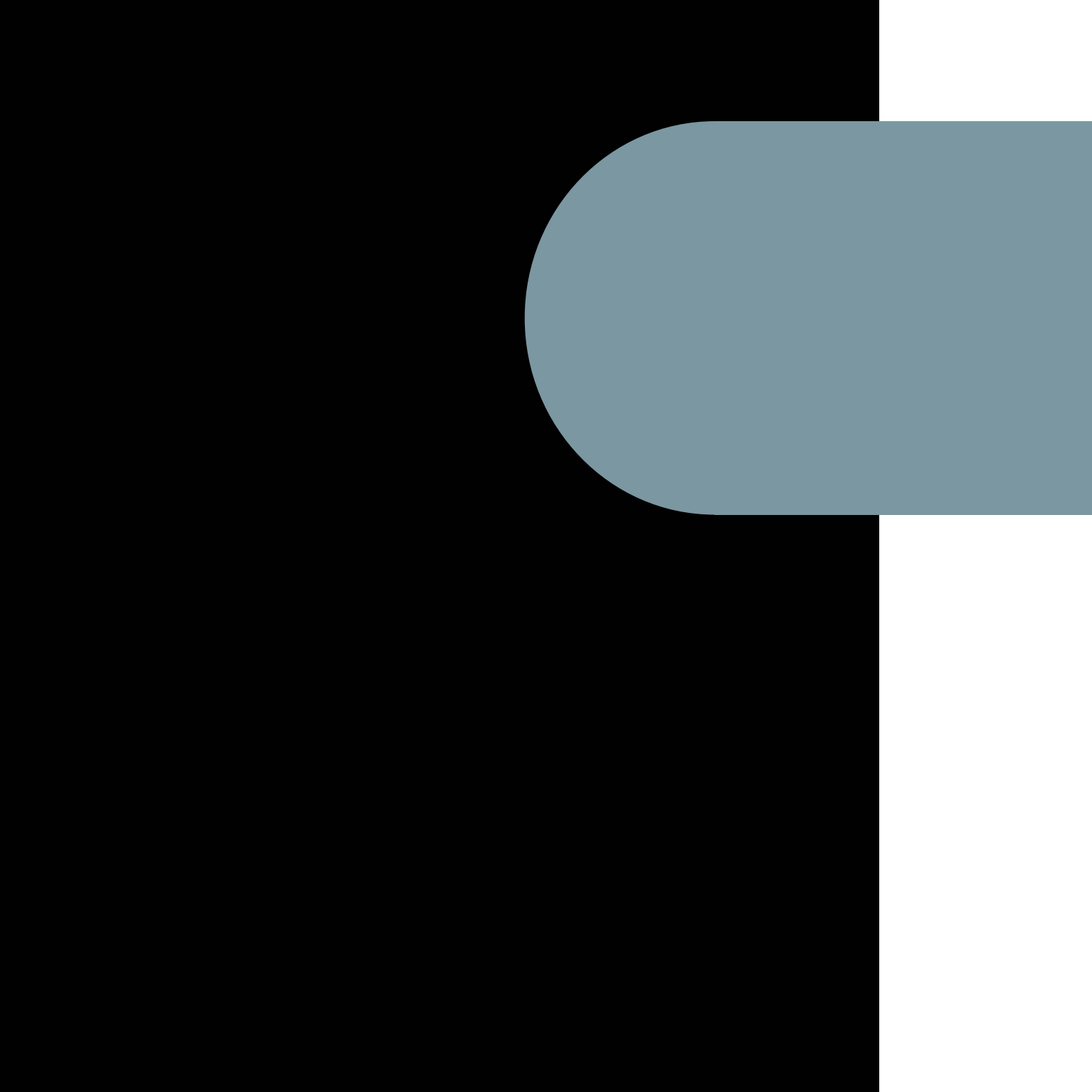
The importance in the flipped approach lies in its emphasis on the importance of active learning as a central teaching activity. That active learning is important, is well in line with current trends in the development of education. For instance the World Economic Forum (2016) identifies new challenges that must be addressed by education in the 21st century such as developing new skills and cross-functional skills, and in this setting the learning goals that can be achieved by active learning strategies are of paramount importance. Higher education faces a need to create innovative models that emphasize human interaction and multimodal learning in order to prompt 21st century skills such as: critical thinking, communication and social entrepreneurship; design and innovation; technological mastery; digital citizenship; complex problem solving skills, with regard to wicked problems (Greenbow and Robelia, 2009).

Educational podcasts can therefore be part of the movement towards new educational models that stress students' competencies rather than credit hours, and therefore look for how to best support collaboration, interaction, and competence development:

It is clear that simply capitalizing on new technology is not enough; the new models must use these tools and services to engage students on a deeper level. (Johnson et al., 2015)

Design principle	Application guidelines	Examples
Provide clear connections between in-class and out-of-class activities	Tell students why you are using this learning method (to allow them to own their learning), and how it develops valuable skills.	<ul style="list-style-type: none"> – Show evidence of impact from previous cohorts. – Use analytics from pre-class activities to inform in-class focus. – Seamlessly integrate pre- and in-class material.
Provide an opportunity for students to gain first exposure to the subject matter prior to class	Determine what students actually need to learn, and use pre-class activities to stimulate interest and provide background understanding.	<p>Videos explaining concepts that are most suitable for re-watching.</p> <p>Interactive online simulations on class content.</p> <p>Videos demonstrating essential skills.</p>
Provide an incentive for students to prepare for class and a mechanism to assess students' understanding of pre-class material	Students need to be incentivised to strategically spend their time with pre-class material. Keep it short and to-the-point.	<ul style="list-style-type: none"> – Nominal pre-class online mastery quizzes. – In-class anonymous quiz to gauge understanding. – Quizzes spliced into videos.
Provide clearly defined and well-structured activities within the flipped classroom, and provide enough time for students to carry out in-class activities	Deeply consider the course content and what are essential and non-essential concepts and competencies. Flipping the classroom often involves reducing content and improving relevance and context.	<ul style="list-style-type: none"> – Create the expectation that online and in-class activities are part of the whole learning experience. – Design a scaffolded problem-based scenario that allows students to construct their own understanding. – Deconstruct an examination question and work through each part through the class.

Design principle	Application guidelines	Examples
Provide facilitation for building a learning community	Teamwork and accountability are powerful motivators. Consider how the classroom space can be used to promote collaboration within student groups and with staff.	<ul style="list-style-type: none"> - Groups discuss a question and offer a response to the class via student response system. - Teams build a concept map summarising key content. - Use online tools (e.g. wikis and social media) to continue building community outside of class.
Provide resources and technologies that are easy to access and use	Use resources and/or technologies that promote collaboration, give students a voice, and provide a safe learning environment.	<ul style="list-style-type: none"> – Provide worksheets to engage students through writing out problems. – Use student response systems to collect feedback. – Exploit collaborative learning spaces where teams synthesize collective knowledge via e.g. Prezi, Google Docs.
Provide prompt/adaptive feedback on individual or group work	Ensure that in-class time is valuable for students. Involve teaching assistants if available.	<ul style="list-style-type: none"> - Offer immediate feedback on pre-class activities. - Walk around a lecture while students are working on problems in groups. - Continue the conversation after class through additional quizzes or resources.



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The series includes

- 1 Tatiana Chemi and Chunfang Zhou,
Teaching Creatively in Higher Education,
- 2 Dorina Gnaur and Hans Hüttel
Podcasting for Teaching and Learning in
Higher Education
- 3 Julie Borup Jensen
Transgressive, but fun! Music in University
Learning Environments

This booklet gives an introduction to podcasting in teaching in higher education, to its underpinnings in research and to the practical issues associated with the use of podcasting in this setting. We first present what has been reported about the pedagogical benefits of integrating podcasts in teaching and outline some of the underpinning educational theory. Next, we focus on practical matters, including the implications and challenges with producing podcasts in terms of academic efficiency as compared to lectures. There is a wide variety of technological solutions available, and we will introduce some of these tools and discuss their use and usefulness.