

Flipped Classrooms: rethinking times and spaces of learning

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This short paper was written for the second module of the Postgraduate Certificate in Academic Practice (Curriculum Design and Development) at Lancaster University. The paper presents a critical survey of the vast body of literature on 'flipped classrooms', arguing that despite the variety within this approach it provides an important call to reconsider how learning is organized both spatially and temporally. Though the majority of the paper is written in a familiar academic style, it ends with a few personal comments as the module was aimed at drawing connections between pedagogical literature and personal practice.

While ongoing transformations in teaching and learning are found in all higher education institutions, the scale, pace, and intent behind changes vary dramatically. Some colleagues focus more upon changing substantive content while others incorporate new learning activities. Some espouse enthusiasm for the possibilities of new technology while others speak about their innovations with reference to learning objectives. Yet even those starting from different places can end up with similar challenges, successes and failures. When encountering discussions of new pedagogical tools or methods, it can therefore be difficult to understand what exactly they encompass. Moreover, incorporating new tools into pedagogical strategies requires not only describing but being able to critically analyze and evaluate how they re-arrange familiar relationships and assumption. This paper focuses on identifying and analyzing what have come to be called 'flipped classrooms', considering what is at stake in this approach to teaching and learning and how it redirects pedagogical attention to more and less familiar issues alike.

The paper begins by first addressing what a flipped classroom is and how it is related to innovations in digital and problem-based learning. It then argues that the benefit and challenge of a flipped classroom approach is that it raises questions about the spatiality, temporality and type of interpersonal interaction at stake in teaching and learning. By decentering longstanding assumptions about the value of encounters such as lectures, flipped classrooms refocus the discussion around how active learning can be facilitated. The paper ends by briefly considering student investment and inclusiveness in the flipped model.

Categories and contexts - what's in a name

While definitions of the 'flipped classroom' abound online, it quickly becomes clear that the term is referring to a broad category rather than a specific type of pedagogical strategy. As Educause notes, "There is no single model for the flipped classroom—the term is widely used to describe almost any class structure that provides prerecorded lectures followed by in-class exercises" ("7 things you should know about flipped classrooms," 2012). This particular definition aligns with one dominant framing of flipped classrooms that

foregrounds technology and the movement of existing pedagogical interactions in space. It suggests that lectures are 'flipped' from class time to home study and homework from home into the classroom. The ability to facilitate this flip is attributed to new technologies that have made videos and podcasts an accessible means of providing lecture components for students to view at their leisure.

Another dominant framing, however, suggests that the real focus is upon flipping pedagogical models. It's not a matter of lecturing or not lecturing in person, but about using different understandings of learning to shift the roles students and teachers take up both inside and outside the classroom. In this view, "what the flip does particularly well is to bring about a distinctive shift in priorities—from merely covering material to working toward mastery of it" ("7 things you should know about flipped classrooms," 2012). This more pedagogically-informed framing of flipped classrooms therefore considers issues such as where and how "first exposure" to concepts (Pierce, Strengers, Sengers, & Bodker, 2013, p. 53) and later "processing" (Pierce et al., 2013, p. 53) or "deeper understanding/learning" occur (Bruff, 2012). These issues have been a part of pedagogical discussions for some time, and therefore many approaches that are now seen to fit the 'flipped classroom' model have been discussed elsewhere in terms of "peer instruction" (Crouch & Mazur, 2001; Slater, 2014), "assessment-centred" design (Pierce et al., 2013) and the "inverted classroom" (Lage, Platt, & Treglia, 2000). Even the teachers who are now credited as pioneers of the flipped classroom first called their approach "educational vodcasting" (Sams, 2011). It is important therefore to recognize that there are many versions of flipped classrooms, and that shorthand definitions or criticisms can distract from the more important conversations about pedagogy and how good teaching involves a continuous process of change and adaptation (Sams, 2011). Moreover, the popularity of the term itself does not mean that anyone is necessarily arguing for its uniqueness – as Svinicki notes, many aspects of flipped classrooms are not new, although the feasibility of such arrangements and their beneficial student outcomes has been facilitated by new technology (2013). In addition to a diversity of terms and practices, there are diverse reasons for adopting the term 'flipped classroom' to describe pedagogical innovations – and it is clear that convention or visibility may be just as important as interest in the idea of a 'flip' when it comes to building momentum behind 'flipped classrooms' (Bruff, 2012; Gerstein, 2011; Pink, 2010).

While this discussion and debate around what to call a pedagogical innovation is not unprecedented, it reflects the diverse contexts in which the 'flipped classroom' has emerged. Different types of flipped classrooms have been successfully incorporated into both secondary and post-secondary education, and resources online thus address a broad audience that includes children, parents, adult students and educators with diverse levels of expertise in their fields. In addition, recent developments in digital provisions and technologies has seen the rise of initiatives such as iTunes University, TED Ed and the Khan Academy which seek to expand opportunities for learning beyond schools and universities. In this context, the flipped classroom can be seen as part of a wider digital move. The need to keep pedagogy and not just the hype of new technology in focus is therefore all the more pressing (Fitzpatrick, 2012). Societal and

institutional pushes to engage in this digital sphere of MOOCs and online learning can feel like an obligation rather than opportunity (Jackson, 2014, pp. 139-140) and are sometimes accompanied by worries that they are part of a bigger plan to replace teachers entirely. As Wright notes, however, flipping classrooms is only a danger to teachers' jobs if teaching is seen to be about delivering content through lectures (2011). Keeping pedagogical issues in focus is therefore important when considering the potential contribution of flipped classrooms. As Driscoll et al.'s study of student satisfaction and experiences in online and campus-based versions of the same course concluded: "quality pedagogy leads to better learning outcomes, regardless of the medium through which a course is being taught" (2012, p. 325). It is the pedagogical value, and not the technological innovation, of flipped classrooms that should therefore be considered and evaluated.

A pedagogical focus highlights that flipped classrooms draw upon well-established work highlighting the benefits of active learning for students' achievement of learning objectives (Biggs & Tang, 2007; Bonwell & Eison, 1991). While the rest of this paper will highlight some of their distinctive features, an initial contrast between flipped classrooms and another popular approach, problem-based learning (PBL) will clarify a few important distinctions in focus and flexibility.

Problem-based learning has become a popular manifestation of active learning, particularly within professional schools training doctors, architects, or business managers. As with flipped classrooms, PBL can take on diverse forms in these different contexts, but generally: "learners solve problems, self-direct their learning by collaboratively assuming responsibility for generating learning issues and processes through self-assessment, and monitor their understanding by learning to adjust strategies for learning" (Cresswell, 2014, p. 7). As Jonassen and Hung note, "the centrality of problem solving to work and everyday life" has led authors to suggest that it "should also be central to education" (2014, p. 7). PBL courses are therefore organized around problems, rather than topics, and these define what is to be learnt, contrasting with problem-solving or inquiry-based strategies where knowledge must be acquired before the problem is introduced (Gabrys, 2013, p. 104). Among the benefits of this approach are documented improvements in student outcomes (Gabrys, 2013; Norman, 2008) and the inherently complex and interdisciplinary nature of many problems, which encourages students to learn skills for life-long learning (Gabrys, 2013, pp. 105-106). While PBL strategies might be useful as one aspect of a flipped classroom approach, the prioritization of problems is not important for a flipped classroom model. Indeed, flipped classrooms in some cases might involve tackling types of problems (such as algorithmic or word problems) that are not appropriate for PBL (Cresswell, 2014, pp. 12, 17). Moreover, while problem-driven and student-directed learning is a central component of PBL, flipped classrooms can accommodate a wider range of approaches. In some cases courses may be organized by topics, or by staged assessment activities (Pierce et al., 2013), rather than by problems. In other cases, students may have no input into learning outcomes, but may determine the topic of 'mini-lectures' through various feedback mechanisms. In this way, while both PBL and flipped

classrooms engage with questions of how active and student-centred learning can enhance educational interactions and outcomes, they foreground different issues in their answers to this complex terrain. The next section therefore looks more closely at how flipped classrooms draw attention to particular aspects of learning and teaching.

Rethinking the times and spaces of teaching and learning

While a focus on active learning is not itself new, flipped classrooms broaden the context in which it must be considered. As Lage et al. note, “Inverting the classroom means that events that have traditionally taken place inside the classroom now take place outside the classroom and vice versa” (2000, p. 32). By taking into consideration both what happens inside and outside the classroom, this approach questions how learning occurs in different spaces and times, and how the different characteristics of these interactions can be best used to encourage the attainment of learning outcomes.

This is not to say that teachers have ignored what happens outside the classroom in the past. Indeed, setting readings to be done before class time, or giving exercises to be completed as graded or ungraded coursework are common means of encouraging students to learn outside the classroom. Yet when in-class time consists primarily of lecture components, this limits the type of interactions that occur between students and teachers. In terms of Bloom’s taxonomy (Krathwohl, 2002), lectures normally engage students with knowledge and comprehension, introducing new concepts in the hope that students will grasp their meaning and be able to identify relationships between them. Students must then go away and use independent study time to try and achieve higher levels of competence that involve application, analysis, synthesis or evaluation. Since these competences are complex, it is little wonder that many students make minimal progress towards mastering them when attempting to do so independently.

Taking into account that students learn across many times and spaces therefore necessitates questioning basic assumptions about what stages of learning a course’s limited face-to-face time should be organized around. While excellent lecturers might convey basic knowledge particularly well, is this the best use of face-to-face time when students can and do encounter new concepts in a variety of times and spaces outside the classroom?

Changes over time have shifted the context in which this question should be considered: “Before the industrial revolution, when books were not yet mass commodities, the lecture method was the only way to transfer information from one generation to the next” (Mazur, 2009). Today a myriad of digital resources make it increasingly easy for people to independently find out basic information and even develop limited comprehension of the relationships between them. Indeed, this basic level of learning is now thoroughly embedded in everyday life, as any instance of using Google or Wikipedia to find a quick answer to a piece of trivia illustrates.

Nonetheless, there are still relatively few spheres in everyday life where higher-order learning objectives are actively cultivated with support from others. While Sennett argues that we can all be craftsmen (2008), opportunities for apprenticeship are often limited due to both available training time and assumptions about which kinds of professions require intense interpersonal training to develop basic competencies. Flipped classrooms therefore offer an opportunity to foreground a different type of interaction between teachers and students. As Brame notes, they suggest that the lower levels of Bloom's taxonomy should be covered outside the classroom so that higher ones can find space inside: "By providing an opportunity for students to use their new factual knowledge while they have access to immediate feedback from peers and the instructor, the flipped classroom helps students learn to correct misconceptions and organize their new knowledge such that it is more accessible for future use" (2013). Instead of being vehicles for the transformation of information, teachers become "coaches or advisors, encouraging students in individual inquiry and collaborative effort" ("7 things you should know about flipped classrooms," 2012). In this way, the flipped classroom is not necessarily about moving the lecture in objective space and time, but about decentring its importance in a context where basic information acquisition is more flexibly embedded within everyday life.

The flipped classroom model therefore encourages consideration of and experimentation with other temporalities of teaching and learning. Displacing first exposure of material from in-person lectures to various types of resources made available in advance raises opportunities to think about how synchronous and asynchronous engagements can be useful outside of a distance or online learning context. Complex material, for instance, can be broken down into smaller chunks to be encountered asynchronously, or interspersed with short activities to promote understanding. While some authors recommend simply recording traditional lectures to then be used as asynchronous resources (Lage et al., 2000, p. 38), other suggest that much shorter (e.g. 20 min) videos are beneficial, and can involve multiple colleagues in a way that would be impossible in most in-person lectures (Forsy, Low, & Glance, 2013, p. 476). Moreover, students have more control over the pacing and repetition of material in a flipped classroom, as they can view materials at convenient times and re-play them as necessary. The temporal flexibility of a flipped classroom can in this way be an appealing aspect for students (Forsy et al., 2013, p. 478).

Interacting in a flipped model of learning

What does classroom interaction look like in a flipped model? There is no one answer to this question, because in each case classroom activities will need to be designed to address basic learning outcomes and the higher order skills that students are expected to develop. Gerstein notes that this ambiguity can be challenge, with some educators not knowing what to do during in-class time once it no longer involves lectures (e.g. Anderson & Adey, 2012; 2011). As Crouch and Mazur highlight, however, this openness can also be read as "adaptability to a wide range of contexts and instructor styles" (2001, p. 970). Acknowledging this adaptability, many flipped classrooms seem to share three

key characteristics: they are 1) student-driven; 2) process-oriented; and 3) feedback rich.

To varying degrees, the material covered in class is adapted to the level students are presently at. One way of doing this is to require students to complete some sort of preparatory work (e.g. short quizzes or written assignments) before class so that the teacher can quickly ascertain their current level of knowledge and any areas in need of further clarification (Crouch & Mazur, 2001, p. 973; Pierce et al., 2013, p. 54). Another similar tactic is to ask students at the beginning of class for any areas needing further clarification and then proceed with a short lecture only if they raise particular issues (Lage et al., 2000, p. 33). In some cases, PBL or student projects can also be incorporated with a much stronger student-driven focus.

In addition, interaction is often process-oriented, in terms of not only engaging students in active learning, but also prioritizing experimentation and contestation. One example is of “economic experiments” such as auctioning off a can of coke to illustrate how demand changes with price (Lage et al., 2000, p. 33). Another strategy particularly suited to larger classrooms is the use of “ConcepTests” where students are given a multiple choice question and then, after choosing their answer, must try to convince someone else nearby that their answer is correct (Crouch & Mazur, 2001; Slater, 2014). The ensuing discussion allows students to share knowledge with each other and has been shown to improve learning even in cases where none of the group members knew the correct answer (Smith et al., 2009). Depending on the discipline and course, these interactions may not seem much different from existing seminars or workshops. The key, however, is that they can be used to highlight aspects of learning that may get lost in more traditional classroom arrangements – quizzes for instance can be used to bring greater conceptual understanding into physics courses (Slater, 2014) or activities can bring quantitative data into social science modules (Olsen & the ESSTED team, 2013).

No matter the form of interactions, by displacing the ‘sage on the stage’, flipped classrooms create more space for informal, formative feedback from both the teacher and peers. Ideally, class time becomes part of a continuous process of feedback: “The students receive productive feedback through the processing activities that occur during class, reducing the need for the instructor to provide extensive written feedback on the students’ work” (Brame, 2013). By creating activities that offer feedback tailored to students’ current levels of knowledge and understanding, the flipped classroom therefore has the potential to make feedback more timely in the ongoing process of students’ learning.

One consequence of unsettling common temporalities of pedagogy is that flipped classroom arrangements can spark reflection upon how educational interactions fit into a cycle of learning. Gerstein has adapted Kolb’s learning cycle (Kolb, 1984) to highlight how the flipped classroom can create ongoing circuits where learners experience, explore concepts, make meaning and then apply and demonstrate it (2011). She suggests that experiences in class can help to get students interested, and then various resources are provided for them to go

explore the concepts further in their own time. Drawing upon Kolb, Gerstein sees personal reflection as a key part of the learning process, and something that can be done asynchronously. Demonstration and application, however, are best done in face-to-face contexts, in order to benefit from the guidance and feedback of others (Gerstein, 2011). Those drawing upon this model of the learning process might place greater importance upon student reflection, in order to complement aspects of the flipped classroom:

Although students' thinking about their own learning is not an inherent part of the flipped classroom, the higher cognitive functions associated with class activities, accompanied by the ongoing peer/instructor interaction that typically accompanies them, can readily lead to the metacognition associated with deep learning. (Brame, 2013)

As Cowan notes, engaging students in reflection can be extremely helpful for learning and development, as reflection for, in, and on action supports students' exploration and consolidation of learning (2014, ch 4). Activities that explicitly engage with reflection can therefore help students to figure out methods for solving problems or making evaluative judgments (Jackson, 2014, e.g. pp. 11, 24), and in this way can be used to further emphasize important process-related aspects of flipped classroom engagements. Moreover, where reflection is built into classroom activities, it can be used to support specific learning outcomes (Jackson, 2014, p. 117), making the best use of all times and spaces of learning so that they build effectively towards formative or summative assessment (Pierce et al., 2013, p. 63). Well aligned learning activities inside and outside the classroom can therefore provide well-rounded support for the attainment of even high-level competences and learning outcomes.

Inclusiveness and investment

While the openness of the flipped classroom model provides great flexibility for educators to adapt it to their disciplines and priorities, it also presents additional benefits to students, despite their understandable apprehension at encountering what is often an unfamiliar model for learning. While few sociologists have taken up flipped classrooms, Forsey et al. conducted a study examining how students adapted to this approach within an Australia Studies course (2013). Their research showed that students' initial uncertainty focused upon worries about unfamiliar types of interaction, concerns that recorded lectures would be a poor substitute for face-to-face ones, and apprehension that more work would be required of them (Forsey et al., 2013, pp. 477-478). Additional barriers to student investment include challenges with accessing technologies, a feeling of being 'ripped off' if video lectures are available freely online, and a sense that they don't need to attend class because materials are available online ("7 things you should know about flipped classrooms," 2012). In order to minimize these barriers, it is crucial that teachers "[set] the right tone in class from the start (including explaining the reasons for teaching this way)" (Crouch & Mazur, 2001, p. 974; Forsey et al., 2013). Mazur, for instance, explains to students what the class will entail and then gives a questionnaire about their expectations which he responds to in writing during the next class, reviewing again any misunderstandings they have about how the class will be taught (2014, pp. 19-21; 71-13). As with online courses, it is also important to have a clear and

consistent structure and set of instructions to guide students through unfamiliar interactions (Driscoll et al., 2012, p. 325). In order, for instance, to ensure that students come to class having reviewed all of the preparatory material, mandatory reading quizzes (potentially graded for completeness) or checklists of completed tasks can increase student motivation and provide feedback on learning to the teacher (Brame, 2013; Bruff, 2010; Crouch & Mazur, 2001; Forsey et al., 2013, pp. 479, 481; Lage et al., 2000). With careful alignment of learning activities with assessments and outcomes, these tools can help to ensure students are supported and motivated during their flipped classroom experience. In Forsey et al.'s study, despite initial uncertainty, students reported considerable satisfaction with the flexibility, richness, and productivity of their experience: they didn't miss the lectures and reported "experiencing an increase in the amount of learning time, which they appear to be doing because the material is so clearly laid out for them and is structured in ways that allow them to feel a sense of achievement when they have completed the set tasks" (2013, p. 481). This suggests that careful design and organization can make flipped classrooms rewarding for students despite their initial misgivings.

In addition, flipped classrooms can be seen as more inclusive spaces for teaching and learning. Their blending of different online and offline interactions incorporates opportunities for many different learning styles to be addressed – as Lage et al. note, inverted classrooms are more inclusive according to many different models of learning styles (2000). The collaborative learning that they encourage has also been found to be beneficial for experiential learners and women in particular (Lage et al., 2000, p. 41), and thus could be of particular benefit in disciplines where student outcomes are divided along gender lines. Recorded lectures may also be beneficial to students whose first language is not English, as they will be able to repeat or slow down sections as necessary in order to ensure comprehension. If these materials are also transcribed or captioned, they will be accessible to hearing impaired students and any others who prefer to have a written transcript for reference. Thus, with proper consideration flipped classrooms can build upon good pedagogy to provide a more inclusive space for learning. Though multiplying types of interactions may at first seem bewildering for teachers, resources can be incorporated in a phased manner, and with feedback from students to ensure that aims and outcomes are being achieved.

Concluding reflections

While at the end of this review I would still find it challenging to sum up 'flipped classrooms' for a colleague, due to their diversity, I do find myself convinced that this model offers much promise for teaching research methods within sociology. Since my aim is to encourage students' development of skills, and not just factual knowledge, the emphasis upon interaction and feedback within the classroom is extremely helpful, and more manageable with large class sizes (50-65) than alternatives like PBL. In addition, shifting first exposure out of class time will help to address challenges relating to my students' diverse levels of prior knowledge about methods. Though this paper has focused on more general pedagogical issues related to flipped classrooms, while reviewing resources I

have also collected a set of more practical notes that will help in the implementation of this approach. Learning about this work has enriched my own knowledge and set of teaching strategies and drawing upon discussions of the flipped classroom will help to justify and communicate the set of pedagogical tools I plan to use in my redesigned course.

At the same time, however, there have been limitations to reading about the use of flipped classrooms within other disciplines, as sometimes the contexts can be too different for useful generalization. I therefore will also be drawing on more specific work related to pedagogies of research methods (Garner, Wagner, & Kawulich, 2009) to complement strategies and ideas from the flipped classroom literature.

Bibliography

- . 7 things you should know about flipped classrooms. (2012). In EDUCAUSE (Ed.): EDUCAUSE.
- Anderson, B., & Adey, P. (2012). Future geographies. *Environment and Planning A*, 44, 1529-1535.
- Biggs, J., & Tang, C. (2007). *Teaching for quality learning at university: what the student does* (3rd ed.). Maidenhead UK: McGraw-Hill Open University Press
- Bonwell, C. C., & Eison, J. A. (1991). Active learning: creating excitement in the classroom (S. o. E. a. H. Development, Trans.) *ASHE-ERIC Higher Education Report No 1*. Washington, DC: The George Washington University
- Brame, C. J. (2013). Flipping the classroom. Retrieved from <http://cft.vanderbilt.edu/guides-sub-pages/flipping-the-classroom/>
- Bruff, D. (2010). Getting students to do the reading: pre-class quizzes on WordPress. Retrieved from <http://chronicle.com/blogs/profhacker/getting-students-to-do-the-reading-pre-class-quizzes-on-wordpress/23066>
- Bruff, D. (2012). The flipped classroom FAQ. Retrieved from <http://www.cirtl.net/node/7788>
- Cresswell, T. (2014). Mobilities III: Moving on. *Progress in Human Geography*. doi: 10.1177/0309132514530316
- Crouch, C. H., & Mazur, E. (2001). Peer instruction: ten years of experience and results. *American Journal of Physics*, 69(9), 970-977. doi: 10.1119/1.1374249
- Driscoll, A., Jicha, K., Hunt, A. N., Tichavsky, L., & Thompson, G. (2012). Can online courses deliver in-class results? A comparison of student performance and satisfaction in an online versus a face-to-face introductory sociology course. *Teaching Sociology*, 40(4), 312-331.
- Fitzpatrick, M. (2012, 24 June). Classroom lectures go digital, *New York Times*. Retrieved from <http://www.nytimes.com/2012/06/25/us/25iht-eduinside25.html? r=0>
- Forsey, M., Low, M., & Glance, D. (2013). Flipping the sociology classroom: towards a practice of critical pedagogy. *Journal of Sociology*, 49(4), 471-485.

- Gabrys, J. (2013). A cosmopolitics of energy: diverging materialities and hesitating practices. *Environment and Planning A*, forthcoming.
- Garner, M., Wagner, C., & Kawulich, B. (Eds.). (2009). *Teaching research methods in the social sciences*. Farnham: Ashgate.
- Gerstein, J. (2011). The flipped classroom model: a full picture. Retrieved from <http://usergeneratededucation.wordpress.com/2011/06/13/the-flipped-classroom-model-a-full-picture/>
- Jackson, S. J. (2014). Rethinking repair. In T. Gillespie, P. Boczkowski & K. Foot (Eds.), *Media technologies: essays on communication, materiality and society* (pp.??). Cambridge, MA: MIT Press.
- Kolb, D. A. (1984). *Experiential learning*. Englewood Cliffs, NJ: Prentice-Hall.
- Krathwohl, D. R. (2002). A revision of Bloom's Taxonomy: an overview. *Theory into practice*, 41(4), 212-218.
- 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.
- Mazur, E. (2009, 2 January). Farewell, lecture. *Science*, 323, 50-51.
- Norman, G. (2008). Problem-based learning makes a difference. But why? . *Canadian Medical Association Journal*, 178(1), 61-62.
- Olsen, W., & the ESSTED team. (2013). Scaffolding to using quantitative data in sociology and politics classroom: building bridges (E. S. S. T. w. E. Data, Trans.). Manchester: University of Manchester.
- Pierce, J., Strengers, Y., Sengers, P., & Bodker, S. (2013). Introduction to the special issue on practice-oriented approaches to sustainable HCI. *ACM Transactions on Computer-Human Interaction*, 20(4), Article 20.
- PInk, D. (2010, 12 Sept 2010). Think tank: flip-thinking - the new buzz word sweeping the US Retrieved 12 June, 2014, from <http://www.telegraph.co.uk/finance/businessclub/7996379/Daniel-Pinks-Think-Tank-Flip-thinking-the-new-buzz-word-sweeping-the-US.html>
- Sams, A. (2011). The flipped class: shedding light on the confusion, critique, and hype. Retrieved from <http://www.thedailyriff.com/articles/the-flipped-class-shedding-light-on-the-confusion-critique-and-hype-801.php>
- Sennett, R. (2008). *The craftsman*. London: Allen Lane.
- Slater, D. (2014). Ambiguous goods and nebulous things. *Journal of Consumer Behaviour*, 13, 99-107. doi: 10.1002/cb.1468
- Smith, M. K., Wood, W. B., Adams, W. K., Wieman, C., Knight, J. K., Guild, N., & Su, T. T. (2009). Why peer discussion improves student performance on in-class concept questions. *Science*, 323, 122-124.
- Wright, S. (2011). The flip: why I love it, how I use it. Retrieved from <http://blogs.kqed.org/mindshift/2011/07/the-flip-why-i-love-it-how-i-use-it/>