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Flipped Learning as a Path to Personalization

Melinda S. Sota

Digital technology is rapidly becoming ubiquitous in schools. One-to-one computing and bring-your-own-device (BYOD) initiatives are helping to ensure that each student has a device with which to work. Although these technologies can support personalized learning, they haven't yet transformed our schools into 21st-century utopias where students engage in interactive, individualized learning applications and access information in order to collaboratively solve problems while teachers roam the learning space, coaching and mentoring as their engaged and self-directed students happily work.

In fact, there have been some large, public failures. Consider, for example, Los Angeles Unified School District's $1.3 billion iPad initiative in 2013. Experts suggested that part of the reason this initiative failed so spectacularly was that it put technology first. Without a clear plan in place, the district purchased iPads not to solve a problem but simply for the sake of incorporating the technology (Lapowsky, 2015).

A technology's potential for improving education lies in its usefulness as a tool for reaching particular goals, and models incorporating technology can help to focus its use for goal achievement. Blended learning models in particular incorporate technology as a key component for reaching specified goals (Horn & Staker, 2015). One blended learning model—flipped learning—has a very simple goal: to maximize the value of in-class time (Bergmann & Sams, 2014). Although fundamentally simple, this model can help to empower teachers and enable them to begin incorporating aspects of personalized learning into their classes.

Blended Learning

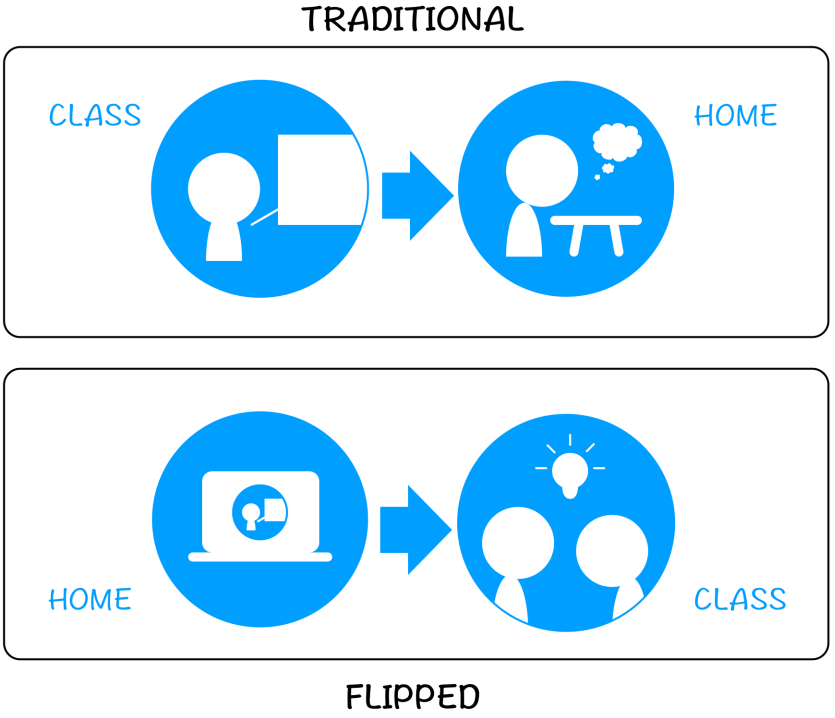
Blended learning "blends" online and face-to-face instruction. The Innosight Institute has defined blended learning as "a formal education program in which a student learns at least in part through online delivery of content and instruction [with] some element of student control over time, place, path, and/or pace AND at least in part at a supervised brick-and-mortar location away from home" (Staker & Horn, 2012, p. 3). Students might engage in online learning at a station within a classroom, in a computer lab at school,

or at home; they might engage in online learning as part of a class or take some courses online and others in a more traditional classroom setting (see Staker & Horn, 2012, for a taxonomy of blended learning models).

The Flipped Model of Blended Learning

The Flipped Learning Network—an organization dedicated to "providing educators with the knowledge, skills, and resources to successfully implement Flipped Learning"—hosts over 25,000 educators in its online learning community. The Flipped Learning Network has defined flipped learning (see Figure 1) as "a pedagogical approach in which direct instruction moves from the group learning space to the individual learning space, and the resulting group space is transformed into a dynamic, interactive learning environment where the educator guides students as they apply concepts and engage creatively in the subject matter" (2014).[1] Started as a grassroots movement and capable of being implemented by individual teachers with minimal support (Bergmann & Sams, 2014; Horn & Staker, 2015), the flipped model has become increasingly popular in both university and K–12 settings. In a 2014 survey of 2,358 teachers conducted by Sophia Learning and the Flipped Learning Network, 78% of teachers reported flipping a lesson, and 93% of those who flipped their classroom did so on their own initiative (Sophia Learning & Flipped Learning Network, 2015).

Figure 1. Traditional and Flipped Classroom



[1] Here, direct instruction refers to a general teaching method often involving lectures or demonstrations by the teacher, rather than the more specific, highly interactive teaching method by the same name (for more information on this more specific instructional method, see the National Institute for Direct Instruction at http://www.nifdi.org).

Jon Bergmann and Aaron Sams, two chemistry teachers from Woodland Park High School in Colorado, are widely credited with developing and popularizing the flipped classroom, although others have also proposed inverting the traditional classroom–homework model (e.g., Lage, Platt, & Treglia, 2000; Mazur, 2009) and the model shares similarities with other mastery-based, student-centered approaches (e.g., Bloom, 1984). Bergmann and Sams observed that, because of sports and other activities, students were often missing classes, and teachers were spending substantial class time catching students up. Sams and Bergmann reasoned that instead of spending their time reteaching material for students who missed class, they could simply record their lectures and refer students to the videos. That proved successful, and students in their classes further extended the use of the videos for reviewing before exams. Sams further observed that students most needed him when they had difficulty with homework. Instead of using class time to lecture—which students clearly could get via a posted video—Bergmann and Sams decided to use class time to offer individualized help, thus giving rise to the flipped learning model (Bergmann & Sams, 2012). Others—perhaps most notably Saul Kahn and Kahn Academy—have helped to support and popularize this model. Rather than a top-down initiative or "best practice" recommended by researchers and mandated by school districts, flipped learning began with and has spread primarily among teachers—teachers who were looking for a way to more easily connect with their students, increase the value of class time, and spend more of their time with students really *teaching* and less time talking at them in "information delivery" mode (Bergmann & Sams, 2014).

Supporting Personalized Learning With a Flipped Model

The flipped learning model has great potential for supporting personalized learning: "instruction that is paced to learning needs, tailored to learning preferences, and tailored to the specific interests of different learners" (U.S. Department of Education, 2010, p. 12). Personalized learning involves "tailoring learning for each student's strengths, needs, and interests—including enabling student voice and choice in what, how, when, and where they learn—to provide flexibility and supports to ensure mastery of the highest standards possible" (Patrick, Kennedy, & Powell, 2013, p. 4). In addition, "personalization refers to a teacher's relationships with students and their families and the use of multiple instructional modes to scaffold each student's learning and enhance the student's motivation to learn and metacognitive, social, and emotional competencies to foster self-direction and achieve mastery of knowledge and skills" (Redding, 2013, p. 6).

Trying to incorporate personalization into a traditional teaching model in which teacher lecture or presentation consumes the majority of class time can be challenging.

Trying to incorporate personalization into a traditional teaching model in which teacher lecture or presentation consumes the majority of class time can be challenging. Content presentation to a whole class often does not allow for flexibility in learning pace, place, or method, and when class time is used for content presentation, less time is available for building relationships and focusing on metacognitive, social, and emotional competencies. The key question to consider when implementing a flipped model is: "What is the best use of face-to-face time with students?" (Bergmann & Sams, 2014, p. 3). The benefits of the flipped model lie in its usefulness for maximizing the value of teacher–student time. By modifying how class time is spent, the flipped learning model can support personalization in several ways:

a. The pace of content delivery can be adjusted for each student's needs because content is always available to be paused, considered, and reviewed.
b. Teacher's expertise in both teaching and content—for example, assessing a student's current skills and knowledge and selecting targeted and appropriate practice opportunities based on that assessment—can be put to better use when more class time is free for individualized work.
c. With more class time available, teachers can also engage in more one-on-one interactions with students, which can help teachers and students build relationships and help teachers gain a better sense of each individual student's interests, strengths, and areas needing improvement.
d. Students have increased opportunities to actively engage in instructional content during class (Bergmann & Sams, 2012, 2014; Lage, Platt, & Treglia, 2000), and increased class time may also offer a greater opportunity for teachers to explicitly teach skills such as critical thinking, communication, and collaboration (Horn & Staker, 2015).

Fundamentally, flipping a class is a means to support student-centered learning and can help to enable individualized, differentiated, and personalized instruction as well as mastery and competency-based approaches (Bergmann & Sams, 2014).

The Teacher's Role in the Flipped Model

Much of the potential benefit of the flipped model centers on a shift in teacher roles. In a traditional model, the teacher delivers the majority of the content in class and may spend most of class time presenting information and modeling skills. In the flipped model, the teacher spends less class time delivering content and more time taking on the role of coach, tutor, and mentor. The teacher may also present content as needed and may create videos or other resources for students to engage in outside of class, but these activities are not central to the teacher's role. Instead, the teacher can spend time evaluating student work and providing feedback during class while the student is actively working (Bergmann & Sams, 2012)—activities that are often completed outside of class in a traditional model.

Flipped Models: Variations on a Theme

In flipped models, student learning activities and problem solving are central, with content playing a supporting role (Bergmann & Sams, 2012, 2014). However, there is not just one "flipped model." Several variations exist which can be implemented in ways that best meet the needs of the teachers and students in a school or individual classroom.

Flipped Classroom 101 to Flipped Learning

Any flipped model implementation will lie on a continuum. At the most basic level, a teacher can flip a lesson by recording his or her in-class presentation and having students watch the video as homework. In class, students do the homework that they would have been assigned. This is what Bergmann & Sams (2014) refer to as "flipped classroom 101." In their view, it serves as an entry point to class redesign and is where many teachers begin. However, this is just the first step in moving toward a flipped learning model that focuses on personalized learning and mastery.

In a "flipped learning" model focused on personalized learning, student projects and problem solving are central to the classroom-based learning experience. This shift in focus may also be accompanied by a shift in perspective, from projects serving as practice in applying the content covered in class, to projects serving as the driver for finding and consuming content: rather than applying content in a project as a means to learn and practice that content, students find information and learn concepts, principles, and processes in order to successfully solve a problem or complete a project. In this model, teacher-created content may no longer be the main source that students use to gain skills and knowledge. Although the teacher may provide a selection of resources, using specific resources may not be required; mastery is the goal, and students may select the best or preferred way to gain the necessary skills and knowledge (Bergmann & Sams, 2014).

A flipped classroom may lie anywhere between the flipped classroom 101 model and a fully personalized, mastery-based, project-centered classroom.

This shift in focus and perspective—from a content-centered classroom where projects serve as practice in applying the content learned, to a project-centered classroom where projects serve as the driver for finding and consuming content—can also be viewed in terms of Bloom's taxonomy. In a content-centered classroom, students start by remembering information and understanding concepts and principles, then applying them to different situations and problems. In a problem-centered classroom, students focus on creating, evaluating, and analyzing. In doing so, they require knowledge and understanding of the fundamental concepts, principles, and procedures related to their work; students work at lower levels of Bloom's taxonomy as needed to support their work at higher levels. This is a sort of just-in-time content learning to support problem-solving and project-based work (Bergmann & Sams, 2014).

A flipped classroom may lie anywhere between the flipped classroom 101 model and a fully personalized, mastery-based, project-centered classroom. In practice, classroom redesign that starts on the more basic side of the continuum may gradually move toward a more personalized model over a period of years as components supporting personalization are added.

Mastery Versus Time-Based Progression

Variations in flipped models can accommodate both traditional time-based instructional schedules and the more flexible schedules required by mastery learning. In a traditional time-based progression, all students move at the same pace but their outcome performances differ. In a mastery-based schedule, students acquire knowledge and skills at different rates, but each student is required to meet a minimum standard before moving on (Bloom, 1968, 1974). The flipped learning model described by Bergmann and Sams (2014) is a mastery model.

Flipped Lessons Versus Flipped Classes

Implementing a flipped model is not necessarily all or none. A teacher may decide to implement a flipped model as her standard class structure, but she might also flip her classroom only a few days a week or for particular units. A survey of 2,358 teachers conducted by Sophia Learning and the Flipped Learning Network (2015) found that, while only 5.4% flip their classroom every day, 20% flip three or four times per week, and 24% flip less than once per week.

Additional Benefits of the Flipped Model

As discussed above, the flipped model supports personalized learning by allowing students to work at their own pace and by freeing up class time which can then be used more effectively by teachers and by students. Additionally:

Students who need the most help can get the most help. In a typical lecture-style class, the best students are often the ones who participate most and therefore receive the most teacher attention. In a flipped model, struggling students will more likely receive the most teacher attention as they practice and apply what they have learned in class. Students who need help can get it, and all students have a greater opportunity (and necessity) to be actively involved during class (Bergmann & Bennett, 2013; Bergmann & Sams, 2012).

Students and teachers can get immediate feedback on their work. Rather than completing homework and then waiting a day or more for feedback, student work is evaluated in class. Teachers can probe understanding on the spot, diagnose student misconceptions, and recommend additional resources. If the student shows mastery, next steps can immediately be discussed and decided upon (Bergmann & Sams, 2012). Importantly, teachers also get immediate feedback on how well their explanations were understood by the student and can elaborate or modify their instruction accordingly. This two-way feedback for both students and teachers can have a powerful effect on learning (Hattie, 2009).

In a typical lecture-style class, the best students are often the ones who participate most and therefore receive the most teacher attention.

Students have more time for collaboration and interaction. With class time focused on student work, there may be more opportunity for student–student interaction and collaboration. Students who understand the content can also help those who are struggling (Bergmann & Sams, 2012).

Students can more easily predict and schedule their homework time. When homework focuses on applying what students have learned in class, that homework may require very little time and effort for some, while others may labor over it. Students (and teachers) may have difficulty predicting how much time will be required. However, when homework involves watching and taking notes on a video or interacting with instructional software, the variability in time spent should decrease and be easier to predict for both teachers and students. This predictability can be important for students who need to schedule their homework time around extracurricular activities, part-time jobs, and family obligations (Bergmann & Sams, 2014).

Students learn to take responsibility for their learning. In a flipped learning model incorporating mastery, students are required to master the content rather than simply get by. Instead of cramming for a quiz in order to get a good grade, students must work to truly understand concepts and principles in order to apply them to problems and projects. In essence, they need to take responsibility for their own learning. Taking on this responsibility can be frustrating for students who have previously focused on achieving the minimum academic requirements. However, when learning rather than getting a grade becomes the focus, it can serve students well in school and in their lives beyond school (Bergmann & Sams, 2012).

Students are required to learn time-management skills. In a flipped learning model incorporating mastery, students need to schedule their work so that they master the material in a reasonable amount of time. Time-management skills—when explicitly taught, supported, and practiced—can be an added benefit of a flipped learning model (Bergmann & Sams, 2012).

Individualization, differentiation, and personalization become possible. Individualization, differentiation, and personalization all refer to models in which instruction is modified based on the needs and/or preferences of learners. For example, in individualized instruction, the pace of learning may differ among learners. In differentiated instruction, the method of instruction might be tailored to learner preferences (for definitions of individualized, differentiated, and personalized instruction, see U.S. Department of Education, 2010). All flipped models involve some individualization (minimally, in terms of the pace of content delivery; Staker & Horn, 2012). In a flipped learning model, greater opportunities for personalization and differentiation exist. Where projects and problems are the central focus, students may have a choice of projects and how they learn the supporting content—by reading, watching presentations/demonstrations, working through interactive simulations or other educational software, or some combination of activities. Gifted students may choose advanced projects and content aligned with the learning goals and objectives (Siegle, 2014). And, because the teacher spends little class time delivering content, he has more time to respond to individual students. Students may work in collaboration with the teacher in determining how they will demonstrate mastery on an objective or set of objectives (Bergmann & Sams, 2012).

Students' repertoires are less likely to be incomplete. In a flipped learning model incorporating mastery, students must master a minimum number of skills at the designated level. This means that they should *not* have gaps in their skill sets that will make later learning more difficult—an important outcome in subjects like math, in which skills build upon one another.

At-home content delivery allows for family interaction. Where videos are used, a flipped model can increase parent participation in students' schoolwork and allow them to see what their child is learning. It even offers the opportunity to learn along with their child (Bergmann & Bennett, 2013; Bergmann & Sams, 2012, 2014). In Bergmann and Sams's (2014) *Flipped Learning*, a fifth-grade teacher tells a story about the parents of one of her students using the videos as a way to learn English.

Resource use can be optimized. The flipped model also offers the opportunity to make the most of resources. Since it is unlikely that all students will be working with the same materials at the same time, fewer materials may be needed. Additionally, because the teacher is no longer responsible for delivering all content, he can use his limited time for more frequent and more meaningful interactions with students. Given greater optimization of classroom resources and more time for the teacher's personal attention for each student, it may be tempting to increase class size under the flipped model. But larger classes may negate some of the benefits of this model; as the number of students increase, the resources and the teacher attention available to each child would necessarily decrease (Bergmann & Sams, 2012).

Some Criticisms, Drawbacks, and Challenges of the Flipped Model

Of course, just as there are benefits to the flipped model, there are criticisms, drawbacks, and challenges as well.

The flipped model relies on lecture-based teaching. One criticism of the flipped model is that it still relies on the lecture, an ineffective teaching tool (Ash, 2012). Although lectures and presentations do have a legitimate place in learning—particularly when they are short and well-structured and when students have the necessary experience, background knowledge, and motivation to learn from them (e.g., Schwartz & Bransford, 1998)—this is a valid criticism of courses based on lecture (see Freeman et al., 2014). However, this is not a fair criticism of the flipped model itself because the model does not require that students watch videos of lectures or demonstrations. The defining attribute of the flipped model is its concern for class time and how that class time is spent. Work outside of class may involve watching videos, but it may also involve reading or engaging with interactive instructional programs. In addition, while transitioning to a flipped model may involve recording lectures and having students watch them as homework, this may serve only as an initial step in modifying the class structure for flipped learning.

The defining attribute of the flipped model is its concern for class time and how that class time is spent.

Content delivery doesn't occur at an optimal time. Some research has shown a benefit of hands-on exploration activities prior to reading or listening to a lecture (e.g., Schwartz, Case, Oppezzo, & Chin, 2011). The flipped model seems to do the opposite—learners first engage with content and then work on projects or problems related to it (Plotnikoff, 2013). However, there is no inherent order to the model. Especially in the flipped learning models focused on mastery and centered in projects and problems, content delivery may happen whenever the need arises. That could very well be after the learner is already heavily involved in hands-on activities related to the content.

It makes the teacher less important. This concern may stem from the belief that content presentation is a teacher's main responsibility or method of teaching. The idea that technology might replace teachers may also feed into this concern (Tucker, 2012). However, in the flipped model, the teacher is even *more* important than in a traditional model because she is assessing every student's progress and providing individualized feedback and coaching. This mode of teaching requires a great deal more expertise in both course content and effective instructional methods than does traditional lecture-based teaching (November & Mull, 2012). At any given time, individual students may be at different levels of understanding and in different places within the curriculum. Therefore, the teacher must have mastery of the content sufficient to allow him to identify student misconceptions, offer explanations, and provide targeted problems or exercises to help each student move forward. Because in a flipped learning classroom this is done on the fly, a deep mastery of the material is necessary as the teacher moves from student to student, providing the feedback, explanations, and practice that each student needs at that time. In addition to content expertise, an effective teacher will need skills in identifying student misconceptions and errors, diagnosing why they might be occurring (for example, is it an issue with the current material being learned or an issue with a prerequisite skill not having been sufficiently mastered?), knowledge of instructional strategies sufficient

to choose a potentially effective method based on the reasons for the student error, and the ability to create or identify a probe to formatively assess whether what the teacher did resulted in improved student understanding.

The work to produce videos or other instructional content requires teachers to do too much work. Producing videos or other instructional content is a significant amount of work. It takes time and a certain comfort with technology to produce the content, and expertise in the pedagogical and instructional design skills to make the content interesting and effective for students. However, not every teacher needs to create all the content for her course. First, a great deal of content is already available online, so teachers can start by locating resources and building a content library. Second, teachers may team up to create content, or a few teachers who have a special interest and skill in producing content might create the majority of it. Finally, when beginning to implement a flipped model, teachers can start by flipping a few lessons or a unit and create new content over a few years rather than all at once. Students can also find and recommend sources that have helped them learn the content (November & Mull, 2012).

Not all students have Internet access. Although the majority of students (82.5% according to the 2013 American Community Survey; see Horrigan, 2015) have broadband access at home, this access varies by income. For example, almost a third of families who make less than $50,000 per year lack high-speed Internet access at home. About 40% of all families in the United States with school-aged children fall into this category (Horrigan, 2015). Although this digital divide is a significant concern that impacts some out-of-class activities that rely on Internet access, such as interactive activities and simulations, alternative access—for example, videos burned to DVD or content loaded onto a flash drive or mobile device—can increase students' access. Students may also be able to access content before or after school or during study halls (Bergmann & Sams, 2012; November & Mull, 2012).

It adds unnecessary homework. For students who do not already have homework assignments, a flipped model may mean an increase in homework time. However, the amount of time spent will likely vary less across students than it does for traditional homework and therefore be easier to predict (Bergmann & Sams, 2014).

Students cannot ask questions while interacting with content. Some may be concerned that students are not able to ask questions in real time during out-of-class content delivery (Milman, 2012). However, students can write down their questions for discussion during the next class period. If the content is being delivered via a learning management system, a discussion board or other place for students to ask questions can also be set up (Bergmann & Sams, 2012).

Students and parents don't like it. Incorporating a flipped model will not magically turn students into eager, self-directed learners. In fact, transitioning from a traditional class structure to a flipped model can be a big and unwelcome change for students. A mastery model in particular can be challenging because it will likely require more work from students—not necessarily in terms of time, but in terms of effort. For those who are used to doing just enough to get by, this transition can be especially difficult. Because the teacher's role is likely to be very different from what students and parents are used to, some may also perceive the teacher as no longer teaching. However, building in time for students to adjust, incorporating explicit instruction and support in time-management

and metacognitive skills, and proactively providing parents with an explanation of and rationale for the new method can help change these perceptions and ease the transition for students (Bergmann & Sams, 2012, 2014).

Teacher Characteristics Necessary to Support a Flipped Learning Model

For teachers who are used to doing planned lectures and demonstrations during class time, implementing a flipped model will feel very different. It also may require new skills, as their classroom work is redirected from delivering content to spontaneously diagnosing and remediating student errors and misconceptions. Bergmann and Sams (2012) list four characteristics that teachers should have in order to implement a flipped mastery model: (a) content expertise that enables the teacher to quickly switch among topics and fully understand how the content is interconnected, (b) the ability to assist students at different levels of mastery and working on different learning objectives, (c) a willingness to research answers with students, and (d) a willingness to allow students to drive their own learning.

The last two characteristics—willingness to research answers with students and willingness to allow students to drive their own learning—might be summed up as "an attitude of inquiry." In other words, the act of learning is the center of the classroom and the teacher and students take part in the learning activity together. The teacher doesn't view himself or herself as a disseminator of knowledge, but rather a partner and guide in the learning process. This attitude of inquiry can be extended to the teaching practice itself: questioning, learning about, and trying out new instructional methods and evaluating the effects of those methods will help ensure that teachers are continually improving upon their teaching processes.

Effectiveness of the Flipped Model

The flipped learning model seems to have the potential to support personalization and increase student learning and motivation—but is it effective? That is a difficult question to answer. And—perhaps—not the right question to ask. Research on this model is just beginning, and much of the research done thus far has focused on university rather than K–12 settings. Although some case studies have shown promising outcomes (Bormann, 2014; Hamdan, McKnight, McKnight, & Arfstrom, 2013), many studies have failed to show significant achievement gains over a traditional model. Bormann (2014) reviewed 19 studies investigating the flipped model and found that most studies did *not* find significant differences in student achievement. However, implementations differ among studies, as do differences between the flipped and non-flipped classes being compared. Because the flipped model is not a single "thing" with a standard implementation, it is difficult to draw conclusions from the research conducted thus far.

Does this mean the model shouldn't be implemented? Not necessarily. Three considerations are important for determining whether this model is worth trying in a specific classroom or school.

First, instead of asking whether this model—in general and across all its many variations—is "effective" (however that is defined), ask whether or not it might be an effective model for meeting specific goals. What is the desired outcome? Increased student achievement? Increased student engagement? Increased teacher satisfaction? More opportunities for students to engage in higher level learning activities—problem solving, analyzing, evaluating, and creating?

Second, it is important to consider the development process used when first employing the model. It's unrealistic to expect that a first attempt at implementing a new model will be successful without planning for considerable change and fine-tuning based on what works well and what doesn't work in a particular context. Flipping a lesson or a unit in a class can serve as a useful start to examining how students respond to the model, where it should be modified and how, and whether student achievement and/or motivation is affected.

Finally, will the flipped classroom improve some fundamental aspect of teaching and learning? There is nothing magical about the flipped model itself, only what the flipped model allows teachers and students to do that they could not do in a more traditional model. For example, to what extent do current in-class activities include components that increase learning and motivation? If not at an optimal level, what could be added, changed, or removed in order to increase these components? Is the flipped model a tool that would allow teachers to more easily make some of these changes? If a teaching model already affords active and meaningful student learning and quality interactions among students and between students and the teacher, then the flipped model may not add anything new.

For example, Jensen, Kummer, and Godoy (2015) compared a flipped model to a non-flipped model. In the non-flipped model, students learned basic concepts and principles in class and did application exercises outside of class. In the flipped model, students did the reverse: They learned the concepts initially outside of class, and then worked on applying those concepts during class. The results showed no difference between the flipped and non-flipped versions on unit posttests. However, when looking at how the actual learning activities differed between the two models, one would probably not expect any difference. Both versions used a 5–E learning cycle with the following five phases:

1. **Engage:** Students are introduced to the material in a way meant to spark their interest—for example, by presenting a puzzling phenomenon.
2. **Explore:** Students can freely explore the material by looking for patterns and making hypotheses.
3. **Explain:** The instructor introduces terminology for the concepts that students have been exploring.
4. **Elaborate:** Students apply these concepts to novel situations.
5. **Evaluate:** Students' understanding of concepts is evaluated by formative and summative assessments.

In the non-flipped version, students went through the *engage* and *explore* phases in small groups using a structured guide to assist them in looking for patterns, making hypotheses, and analyzing data. Because both the instructor and teaching assistants facilitated these phases, students received immediate and individualized feedback. Rather than a lecture typical of a traditional teaching model, the *explain* phase was interspersed in the small-group work and involved brief, whole-class discussions clarifying concepts and introducing terms. The *elaborate* phase involved solving novel problems as homework.

The flipped version involved online, individual work during the *engage* and *explore* phases. Students were still encouraged to find patterns, make hypotheses, and analyze data; however, they were unable to discuss with others or work directly with materials. Instead, they watched a video of someone else working with the materials. They did

receive immediate feedback online after answering questions. In class, the instructor first answered questions students had from the homework; then, the *elaborate* phase was completed in class, with students working in small groups to apply the concepts to novel situations. The instructor and teaching assistants were available to interact with students and provide immediate feedback during this time.

The only difference between the flipped and non-flipped versions in this study was whether students initially encountered the concepts outside of class or in class. Both versions seemed to be rich in opportunities for active learning and in interactions with the instructor and other students, but one could argue that the flipped version was less rich because the students lost the opportunity for initial exploration and discussion of the material. Instead of exploring it themselves and engaging in discussion, they watched others working with the material and did not have the opportunity to engage in discussion. Given the argument that the flipped model has its advantage in freeing up class time to increase active student learning and engagement, there doesn't seem to be a strong argument for flipping a classroom already rich in these elements. Further, in this case, some interaction was even lost in the flipped model, as student interaction during the engage and explore phases was transformed into student observation.

This analysis is not meant as a criticism of this study. The authors were specifically attempting to control for active learning in both versions; therefore, this design was entirely appropriate for this purpose. However, this analysis is meant to illustrate that the potential benefit does not lie in the flipped model itself, but instead in the opportunity for increasing the quality of student interactions that we know can effectively raise student learning and engagement.

The Real Value of the Flipped Model

Asking whether a flipped model is or is not superior to a non-flipped model is the wrong question. Rather, will a flipped model allow a school or a class to more easily add components that support student learning and engagement? The flipped learning model may be beneficial to the extent that it allows for an increase in these components.

Although it is often portrayed as a model in which students watch lectures outside of class and do their homework during class, this characterization is unfair and doesn't take into account the model's many variations. The fundamental goal of the flipped model is simple: to maximize the value of student–teacher time. Perhaps the real value of the model is in encouraging teachers and administrators to think deeply about this issue and begin experimenting with class structure.

Action Principles for States, Districts, and Schools

Action Principles for States

a. Provide resources for classroom redesign, including funding for design research, research dissemination, professional development, and resource development.
b. Provide resources for conducting evaluations that capture outcome measures related to multiple success factors, including academic achievement, time management and self-regulation/metacognitive skills, student engagement and motivation, and teacher satisfaction.
c. Establish goals and outcomes without mandating specific resources, technologies, or methods.

d. Encourage local experimentation by individual districts and schools in order to reach goals. Celebrate success and support problem solving without punishing failures.
e. Assist in dissemination of successes, best practices, and lessons learned across districts and schools.

Action Principles for Districts

a. Offer professional development, coaching, and other resources to support teachers in employing effective practices—for example, how to design more effective instructional resources and learning activities, how to explicitly teach metacognitive skills, or how to diagnose and remediate student errors.
b. Do not mandate specific technologies or methods. Provide resources, but allow teachers to experiment with what works best in their own classrooms.
c. Compensate teachers fairly for redesigning their classes.
d. Support experimentation and sharing of successes and failures. If goals have not been reached, assist schools in problem solving.
e. Plan for implementation of the model to take several years. If a school is moving from a traditional model to a mastery-based model, this shift will likely involve a cultural shift for the school and a fundamental shift in how both teachers and students approach school and learning.

Action Principles for Schools

a. Start small. Redesigning class structure is a years-long process, but a teacher can begin the process simply by flipping a single lesson or unit.
b. Allow plenty of time for planning, design, implementation, and collaboration. Each day of in-class work needs to be planned carefully to result in optimal learning and engagement, and activities will need revisions and fine-tuning after they've been tried. Provide additional time for teachers to collaborate in designing their lessons and solving problems together.
c. Assign a dedicated IT person to work directly with teachers on the technology and workflows required to more easily create and post learning resources.
d. Proactively inform parents about the flipped model in order to ease concerns.
e. Don't punish teachers for trying things that fail. Instead, work to develop a culture that supports experimentation and the open sharing of goals, successes, and failures with both administrators and fellow teachers.

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