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# Flipping a Classroom: An Innovative Approach to Prepare Students *for the* 21st Century Workforce

DEVELOPING THE 21ST  
CENTURY WORKFORCE

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## Introduction

**Flipping a classroom is not a new phenomenon.** In fact, many educators engage in some sort of curriculum flipping right now. Flipping a classroom is an instructional strategy and a type of blended learning that reverses the traditional educational arrangement by delivering instructional content outside of the classroom and moves activities, including those that may have traditionally been considered homework, into the classroom. For example, teachers might have students read a book before class so informed discussion may occur during the class, or could require students to complete math problems outside of class in preparation to work on more advanced problems during class.

Flipping curriculum is also an innovative approach to teaching computer software, and a better way for students to learn the problem solving skills they will need when they graduate and go out into the workforce. Flipped learning moves direct instruction from the group learning space to the individual learning space, thus transforming the group space into a dynamic, interactive learning environment where the educator guides students as they apply concepts and engage creatively in the subject matter.

## Background

There has been significant research on flipping classrooms and the impact on student learning. An article titled "From Sage on the Stage to Guide on the Side" acts as a precursor to the current movement on flipping the curriculum in the classroom. The basis of the article is that the constructivist learning model moves the teacher from the lecture stage to the students' guide. The teacher is still responsible for presenting the material, but does so in a manner in which students can better relate and interact with the knowledge in a way that makes more sense. Because students engage more actively in their learning, deeper understanding of the subject is promoted (King, 1993).

Lage, Platt, and Tregalia (2000) found that students with various learning styles are better able to learn at their own pace in the flipped classroom. The instructor still focuses on a specific outcome, but allows the student to choose the best method to reach this outcome. Herreid and Schiller (2013) surveyed members of the National Center for Case Study Teaching in Science to identify flipped classrooms by STEM case study educators and found that 200 teachers cited the following as some of the reasons for using a flipped classroom:

1. There is more time to spend with students on authentic research;
2. Students get more time working with scientific equipment that is only available in the classroom;
3. Students who miss class for extracurricular activities can watch the lectures while on the road;
4. The method “promotes thinking inside and outside the classroom”;
5. Students are more actively involved in the learning process; and
6. Students really like it.

Additionally, the results of a study of an introductory STEM mathematics course showed that students performed as well as students in the traditional classroom, but enjoyed the class more, which is an important aspect of keeping students interested in introductory STEM courses (Love, Hodge, Grandgenett, & Swift, 2014).

Mason, Shuman, & Cook (2013) compared the effectiveness of flipped classroom to a traditional lecture class in an upper-division Engineering course. The results of their study revealed that students in the flipped classroom demonstrated equal or better quiz and exam grades, better scores on design related problems, and had equal or greater satisfaction when compared to the lecture class.

Many educators using the flipped classroom approach say they are able to cover more material and provide more learner-centered activities, all the while encouraging students to become independent learners and improved problem solvers. The flipped classroom provides teachers extra time to work with students on higher order projects, and allows students to collaborate in cooperative groups to solve problems (Hawks, 2014).

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## Innovative Approaches to Flipping Software Instruction

Flipping the curriculum relative to software instruction can be quite successful with the variety of technologies available to educators. Not only can teachers create lecture “movies” with software like PowerPoint, they may also provide them to students for viewing online using classroom management systems like Blackboard or free services like YouTube. Teachers may take existing lectures, update them as needed, and provide recordings of them for students to watch outside of class.

Teachers may record specific software lessons for students to watch outside of the class using software like Snagit (<http://www.techsmith.com/snagit.html>) or Adobe Captivate (<http://www.adobe.com/products/captivate.html>). These original software lessons might be anything from the most basic to the most advanced, and by recording them digitally students could view them outside of class as many times as needed.

Educators may also direct students to online resources like YouTube, Google, or even tutorial sites like Lynda.com. By providing online lectures and lessons specifically related to the software instruction, the teacher will have more time during the class period to work with students individually or in small groups. This approach allows more time for students to ask questions and solve problems with the teacher present.

## Flipped Learning and Problem Solving Skills

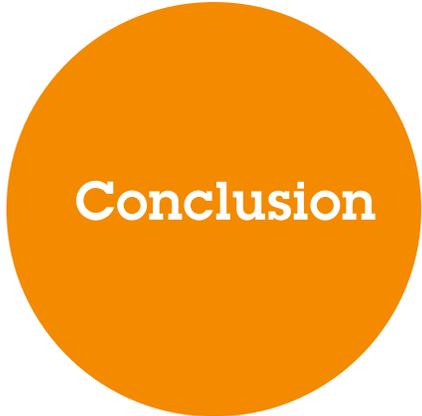
Problem solving is a significant skill required of employees by 21<sup>st</sup> Century employers. According to a 2014 Department of Labor report, “Employers want employees who can work through problems on their own or as an effective member of a team. Ideal employees can think critically and creatively, share thoughts and opinions, use good judgment, and make decisions,” (ODEP, 2014). And, according to a report on 21<sup>st</sup> Century skills required by employers, “Students need to get more experience in real-world problem-solving and other “21<sup>st</sup>- century skills” to improve the quality of their performance when they join the workforce,” (21st CENTURY SKILLS, 2013, p. 50).

The importance of teaching students to be problem solvers can be evidenced in the 2014 report showing American 15 year olds tested barely above the average of 44 countries who took the Programme for International Student Assessment – Creative Problem Solving Test. American students scored an average of 508, while top-ranked Singapore scored 562 and bottom-ranked Columbia scored 399 (Resmovits, 2014).

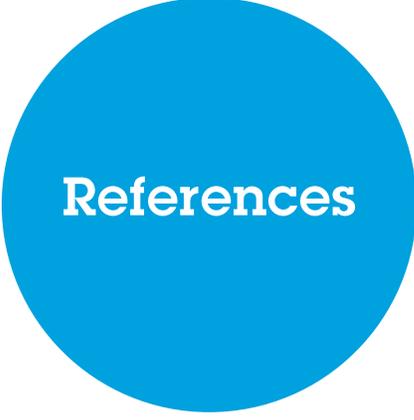
One innovative approach to build students' problem solving skills in the flipped classroom is a strategy called "think-alouds." This technique helps students to make the internal problem-solving process explicit. Educators accomplish this by targeting instruction on verbalization, which helps students become aware of their thought process, and thereby improves their ability to identify and correct their own errors. In the flipped classroom time is afforded to introduce and guide students through the ACE Problem Solving Process using verbalization:

1. Analyze the task: interpret and understand what is provided in the task;
2. Create a plan: connect the given information and goal with models, concepts, and relationships;  
and
3. Execute the plan: follow the plan until the goal is attained.

Flipping the classroom does take focused time and effort, but the benefits of the flipped approach are considerable. Students take more responsibility for their own learning. They learn to think more critically, communicate more effectively, and have a greater appreciation for the unique importance and logic of the subject. Students experience at least some of the satisfaction of learning how to think in a new and, some cases, life changing way. They become more engaged in their own learning, and benefit by becoming better problem solvers, which is what 21<sup>st</sup> Century employers are looking for in new hires.



**Conclusion**



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