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Flipped classroom: An innovative learning model in digital era

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Abstract
The study aimed to emphasize that digital revolution has crucial influences on the field of education as in many other fields. The relevant influences have led to radical changes in terms of teaching and learning approaches approved in the field of education. The students in our age have quite different characteristics when compared to the past, and their expectations have been shaped accordingly. Hence, it is quite difficult to draw interest and curiosity of the students today to learning activities through the traditional teaching approaches. Moreover, it is not easy to overcome some problems regarding teaching and learning by obsolete approaches. In this regard, the educators today show highly much interest in the innovative teaching approaches that address the needs of this age. One of those approaches is flipped classroom model. In this study, the conceptual and historical foundations of the flipped classroom model as being one of the popular instructional models in recent years, theoretical background of the model, and the advantages and disadvantages of the model in teaching processes were highlighted. Furthermore, interpretations concerning what kind of a role flipped classroom model would play to get over some problems in the field of education were included.

Keywords: flipped classroom, digital era

Introduction

Nowadays some parents and educators find the new generation's interest in computers, smart phones, tablet PCs and similar technologies, and how those technologies are used by this generation strange and children creative ideas and thinking. They compare the current habits with the old, as well. In this regard, Prensky (2001) points out that the 'digital immigrants' who cannot be flexible in their thoughts waste their precious time by grumbling that things were better before. He adds that on the contrary, those who can think in a flexible and perceptive manner attempt to comply with the digital world by getting help of the new generation while acknowledging that they are not informed enough about the unusual world of this generation. Student created video content is an emerging form of flipped learning that nicely supports the deepening of knowledge as well as developing 21st century skills of creativity, critical thinking and communication. The 21st Century Skills of the Flipped Classroom. 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

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).

History

In 1993, Alison King published "From Sage on the Stage to Guide on the Side," in which she focuses on the importance of the use of class time for the construction of meaning rather than information transmission. While not directly illustrating the concept of "flipping" a classroom, King's work is often cited as an impetus for an inversion to allow for the educational space for active learning.

Harvard professor Eric Mazur played a significant role in the development of concepts influencing flipped teaching through the development of an instructional strategy he called peer instruction . Mazur published a book in 1997 outlining the strategy, entitled Peer Instruction: A User's Manual. He found that his approach, which moved information transfer out of the classroom and information

assimilation into the classroom, allowed him to coach students in their learning instead of lecture.

Concept of the Flipped Classroom

As one of the most popular trends in education in recent memory, you've undoubtedly heard of the flipped classroom. But what is it about a classroom that's been flipped that makes it unique. A flipped classroom is one where students are introduced to content at home, and practice working through it at school. In this blended learning approach, face-to-face interaction is mixed with independent study via technology. Students watch pre-recorded videos at home, and then come to school to do the homework armed with questions and at least some background knowledge. The concept behind the flipped classroom is rethinking when students have access to the resources they need most. If the problem is that students need help doing the work rather than being introduced to the new thinking behind the work, than the solution the flipped classroom takes is to reverse that pattern.

This doubles student access to teachers once with the videos at home, and again in the classroom, increasing the opportunity for personalization and more precise guiding of learning. In the flipped classroom model, students practice under the guidance of the teacher, while accessing content on their

Own. A side benefit is that teachers can record lectures that emphasize critical ideas, power standards, and even the pace of a given curriculum map. It also has the side benefit of allowing students to pause, rewind, Google terms, rewatch, etc., as well as creating a ready-made library for student review, make-up work, etc.

Related study of the topic

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.
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-cantered 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 21st Century employers. According to a 2014 Department of Labour 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 21st Century skills required by employers, "Students need to get more experience in real-world problem-solving and other "21st- century skills" to improve the quality of their performance when they join the workforce," (21st CENTURY SKILLS, 2013, p. 50).

Association of Technology, Management and Applied Engineering

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-aloud." 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. Analyse 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.
3. Execute the plan: follow the plan until the goal is attained.

For many, flipping the classroomsimply involves turning the traditional classroom on its head - moving the class work home, and the homework to class. Others argue there is a lot more to flipping than meets the eye. Rather, as flipped learning pioneer, Jon Bergmann states, it's moving from "sage on the stage" to "guide on the side." For students, the obvious benefit lies in the ability to pause and rewind the teacher at will. For teachers, it means less time creating lectures, and more engaged students as the boring introductions are pushed out, and the fun practical work is pulled in. Yet, looking at the 21st century skills embedded within flipping that are so essential to the modern learner, the benefits are much more apparent.

Flipped Learning's 21st Century Skills

1. Independent Learning

By moving direct instruction outside of the classroom, students are encouraged to engage in metacognitive learning. Here, the students can learn in a setting, and at a pace, that suits their needs, facilitating a personalized experience and promoting independent learning.

2. Critical Thinking

As 21st century learners, critical thinking has never been more of a focal point. Through independent learning, students are encouraged to think critically, thus promoting their curiosity and broadening their knowledge. Critical thinking teaches the obstacles of dependence and the benefits of self-confidence - invaluable lessons that prepare students for an increasingly unpredictable future.

3. Collaboration

We are all aware of the benefits of effective collaboration, and luckily it has never been so easy to facilitate. Through the flipped classroom model, students are urged to collaborate effectively using social media outside school walls, while the classroom itself becomes a proactive hub for positive and productive peer-to-peer instruction.

4. Digital Literacy

Digital literacy is one skill that no 21st century learner can do without. By using technology to view lessons, interact and collaborate on a daily basis, students open themselves up to a world of possibilities through technology. Digital literacy and digital citizenship are embedded in their use of technology as they are encouraged to use their devices as platforms for learning and development, as opposed to social accessories.

5. Digital Citizenship

Facilitating the evolution from 'digital native' to 'digital citizen' is another focal point for education of the 21st century. Encouraging students to work side by side in a digital environment teaches the basics of respect and cooperation in an online world. Flipped learning brings digital collaboration to the fore, building that mutual understanding that's rooted in the digital citizen.

6. Creativity

In order for students to become independent learners and thinkers, fostering their curiosity and feeding their creativity is key. Learning outside the classroom, equipped with the tools to unleash their imagination, students are urged to be innovative and inquisitive thought leaders. With innovation and creativity proving to be key drivers of 21st century success, it's the age of the innovator.

7. Social Skills

Growing up in a culture of social media is not an easy feat, and one that can further hinder a person's social growth. By converting the classroom into a more active, collaborative workspace you can place the emphasis on forming healthy relationships and building productive teams.

8. Problem-solving

Another essential skill for the 21st century learner, problem-solving is a complex ability too often overlooked as inherent. With a steady routine of collaborative communication and a constant flow of independent learning, a student's problem-solving skills can evolve hugely and adequately prepare them for the challenges ahead.

While only a brief outline of the many skills embedded within flipped learning, there are several more. The flipped classroom is the ideal model to invest in 21st century skills, and provide students with a one-to-one learning experience, that works around them.

Nowadays some parents and educators find the new generation's interest in computers, smart phones, tablet PCs and similar technologies, and how those technologies are used by this generation strange. They compare the current habits with the old, as well. In this regard, Prensky (2001) points out that the 'digital immigrants' who cannot be flexible in their thoughts waste their precious time by grumbling that things were better before. He adds that on the contrary, those who can think in a flexible and perceptive manner attempt to comply with the digital world by getting help of the new generation while acknowledging that they are not informed enough about the unusual world of this generation. Student created video content is an emerging form of flipped learning that nicely supports the deepening of knowledge as well as developing 21st century skills of creativity, critical thinking and communication. The 21st Century Skills of the Flipped Classroom, provide long life learning.

For many, flipping the classroom simply involves turning the traditional classroom on its head - moving the class work home, and the homework to class. Others argue there is a lot more to flipping than meets the eye. Rather, as

flipped learning pioneer, Jon Bergmann states, it's moving from "sage on the stage" to "guide on the side." For students, the obvious benefit lies in the ability to pause and rewind the teacher at will. For teachers, it means less time creating lectures, and more engaged students as the boring introductions are pushed out, and the fun practical work is pulled in. Yet, looking at the 21st century skills embedded within flipping that are so essential to the modern learner, the benefits are much more apparent.

The Benefits of the Flipped Classroom

A flipped classroom is an instructional strategy and a type of blended learning that reverses the traditional learning environment by delivering instructional content, often online, outside of the classroom. It moves activities, including those that may have traditionally been considered homework, into the classroom.

- Students can consume lecture materials at their own pace. In traditional lectures, students are bound to the pace that the instructor sets for the course. ...
- The teacher is present while students apply new knowledge. ...
- Results from flipped classrooms show promise.
- Students can consume lecture materials at their own pace In traditional lectures, students are bound to the pace that the instructor sets for the course. If a student has difficulty understanding a concept during a lecture, he or she is forced to slow down the rest of the class by interrupting and asking for additional clarification or do his or her best to keep up and ask for guidance at the end of class. By contrast, in flipped classrooms, students can review and replay any parts of the lecture that they're having trouble with as many times as they need. If students continue to have issues, they are able to come to class prepared to ask specific questions about the concepts that give them pause.
- The teacher is present while students apply new knowledge. In the traditional classroom, students show what they've learned in class through homework. This order of events is suboptimal because, at home, students typically do not have resources to turn to should they have questions. Consequently, a student must wait until the next class session or wait until the professor's office hours to receive help or turn in incorrect homework. Bringing homework into class time gives teachers insight into which concepts, if any, that their students are struggling with and helps them adjust the class accordingly.
- Results from flipped classrooms show promise. There is growing evidence that the flipped classroom model can improve student achievement in nearly any subject.
- According to the Flipped Learning Network, 71% of teachers who flipped their classes noticed improved
- Grades, and 80% reported improved student attitudes as a result. What's more, 99% of teachers who flipped their classes reported that they would flip their classes again the following year.

Teacher effective teaching environment of a flipped classroom

Flipping the classroom does exactly what it sounds like. It reverses the traditional learning dynamics, completely. With this method, students don't learn new content in the classroom, by having a teacher instruct them. Instead, they learn it from video and online sources in their own time and place. Meanwhile, problems and assignments that once might have been treated as homework are now tackled in the classroom, while teachers offering personalised guidance. There are a number of advantages to this method. This week's blog sums up seven key ones.

1. More one-to-one time between teacher and student

A flipped classroom dramatically increases the amount of time you have to spend with each student. It also create a platform for them to ask questions or seek extra help with an area they're finding challenging.

2 .More collaboration time for students

The project-based work that now takes place in the classroom need not be on an individual basis. A flipped classroom enables students to spend more time collaborating with one another: not only a great way to learn, but also good for their team working skills.

3. Students learn at their own pace

Because 'knowledge acquisition' now takes place outside the classroom, each student can control it to match their own personal abilities and appetite. A traditional classroom instruction-based method relies on every student absorbing and understanding at the same time and pace. Flipped learning doesn't. This can be particularly liberating for slower learners. No longer do they feel the burden of having to 'keep up'; they're free to learn in a way that works for them. And if they want to go back and study something again, they can.

4. It encourages students to come to class prepared

After students have engaged with digital content at home, they can come to the classroom prepared with ideas and questions. It's a great way to involve students in shaping the classroom sessions, and thereby nurture their sense of responsibility.

5. Practical things – like missing class due to illness – become less problematic

It used to be that, if a student missed a lesson, they missed learning something. Not with flipped learning. Because students engage with a lesson on their own time, and away from school, absence need not detract from them learning the material.

6. Subject matter content becomes infinitely richer

Previously, students were only exposed to one source of information on a topic: that which the teacher gave them in class. With flipped learning, they can explore much more. They can access multiple sources, and equally you can direct them towards sources from other teachers, and more. This diversity will only increase their comprehension of the subject.

7. It's cost-effective!

Because students use their own devices to access content, there's no need for a school to invest in hundreds of new computers or classroom gadgets. The only thing you now need to give: more of your personal time and attention.

A teacher's interaction with students in a flipped classroom can be more personalized and less didactic, and students are actively involved in knowledge acquisition and construction

as they participate in and evaluate their learning.[to prepare materials and videos before a lesson, lecture, class or session takes place in comparison to the traditional classroom model. The effort put in is worth the while because the flipped classroom model has been proven to increase the retention of knowledge learned and make valuable class time more worthwhile for learners. The use of blended instruction is in fact very compatible with most of our commonly accepted practices of learning theory. As far as the overall effectiveness of the pedagogy goes, the blended teaching method will lead to higher-level and higher-order thinking skills, a deeper appreciation of an academic community and an increase in self-regulated skills, such as time management (Pregot, 2013). Blended instruction, the use of concrete-sequential learning modules, the integration of greater visual imagery, and access to customized time allotment, will produce a positive impact on overall student outcomes. When an instructor takes the effort and integrates well-constructed blended teaching principles aligned with individual students' needs, the final course outcomes will be just as or even more effective for most students compared to a direct face-to-face class environment (Cheong et al, 2012).

The steps to preparing in-class activities are as follows:
Best Flipped Learning Classroom Activities
As the modern classroom continues to change and grow, the flipped classroom model continues to be redefined. When developing your own flipped learning classroom activities, there will be growing pains. However, you can be prepared for them if you are aware. To help you out, here are some solutions to help you get the best from making your own videos/screencasts.
1. Writing the Script-Keith Hughes does this well. It's comprehensive, clear, efficient, and accurate.

2. Choosing the Method-Check out this article from Andrew Douche on the best screen casting software for teachers. Next, have a look at Katie Gimbal's Flipped Classroom

3. Content Curating
Although making your own videos is optimal when designing flipped learning classroom activities, content duration can help get the job done. Maybe the content you want to use has already been done before. Here's an expert's take on using other people's videos.

4. Accountability
What do you do if a child has not viewed content? This should tell you that they have not been adequately prepared to complete the task at home.

- If students come to your class unprepared, don't re-lecture. This would send the wrong message that they can decide whether to flip your class or not.
- The video-watching process needs to be scaffold. Teach them how to watch, take notes, and engage in the content proactively rather than passively. Model the process for them.
- As you teach them how to work within the flipped classroom environment, fewer will resist. These you can handle case by case.

5. Achieving Access for All
Not everyone will have technology at home to view the video. For low-income families, this may be an issue. There are a few ways to address this:

- Create alternative methods for distributing your videos (e.g. DVD, jump drives, etc.)
- Library computer access
- Make videos accessible on different platforms, or different devices

6. Testing for Comprehension
You will need a means of formative assessment for viewing videos. This can still be done at home with online test programs. Google Forms can help you tally responses to questions after the video. Check out this article from NWEA listing tools for classroom formative assessment practices.

7. Conquering the Fear of Beginning
This is where teamwork comes in. It's about making optimal use of the resources and expertise you already have around you. You can opt to get your tech team involved. Enlist their help to set up a flipped classroom or recording studio. You can even have students hold a camera while you teach.
The point is to get help with flipped learning classroom activities from those who have done it already. Such veterans are comfortable with the technology. It won't be long before you're just as comfortable and proficient as they are. You can also check out Project Fizz and this flipped learning toolkit from Edutopia for more ideas.

8. Rethink Your Role
You will go from someone in front of the classroom to someone who can move about and interact with students in a one-on-one or smaller group setting. You can differentiate because you have essentially "duplicated" yourself. You've let your alter-ego do the lecturing while you do the inquiry and dialogue. Your thorough preparation will pay off in the long run. You'll become a facilitator, and students will own their learning. As you duplicate yourself on video, you expand your outreach. You're now available in your students' homes, and the homes of others. More teachers and students will benefit from your expertise. Anyone who wants to learn from your videos, in or out of school, can do

9. Getting Administrators/Parents on Board
There are numerous videos and websites dedicated to documenting the success of using flipped learning classroom activities. Here's just a few to get you started:

- Flipped Classroom Success Stories
- Flipped Classroom Best Practices from Clintondale High School
- A Teaching Strategy with Success Stories: The Flipped Classroom

Forge ahead and take it upon yourself to flip your own classroom. Document the results, and keep extensive records of your successes and stumbling blocks. This is so you can really see both your students' progress and your own.
Some parents may not be comfortable with too much screen time for their kids. If you are making your own videos, a sense of trust can be established between parents and teachers. They know that kids aren't wasting time because you have taken the time to create your own content.

10. Overcoming Student Resistance

Believe it or not, friction may happen when your students' preconceptions of traditional school are challenged. This is where you teach them how to interact with the videos. Escort them through the tour of this new learning environment.

As with any teaching model, remember that we are striving toward learner-driven education. It is inevitable that a different technique will have its detractors. Remember that these are paths that are Flipped classrooms also redefine in-class activities. In-class lessons accompanying flipped classroom may include activity learning or more traditional homework problems, among other practices, to engage students in the content. Class activities vary but may include: using math manipulatives and emerging mathematical technologies, in-depth laboratory experiments, original document analysis, debate or speech presentation, current event discussions, peer reviewing, project-based learning, and skill development or concept practice. Because these types of active learning allow for highly differentiated instruction, more time can be spent in class on higher-order thinking skills such as problem-finding, collaboration, design and problem solving as students tackle difficult problems, work in groups, research, and construct knowledge with the help of their teacher and peers.

- How to Use Fluency-Style Flipped Learning for Great Teaching Adventures
- The Complete Flipped Learning Beginner's Guide for Teachers
- A Flipped Learning Journey Featuring Jeremy LeCornu.

Criticisms of the Flipped Classroom

Of course it's not that simple, and there are pros and cons of a flipped classroom.

As a learning model, criticisms include reduced opportunity for self-directed critical thinking, decentering the role of the student, encouraging a lecture-driven march through curriculum, and in general simply streamlining an already industrialized approach to learning.

And just like in a regular classroom, success depends greatly on the quality of the teacher, the clarity of communication, and the quality of given curriculum, assessment, and instruction. Further, equity is still a major issue, and it doesn't address the dated approach most educational systems take to curriculum. So there's that. A Clarifying Image, But new thinking about how students learn is still thinking all the same–and below is an image from Suanne Bloemarts via coetail.com that nicely summarizes the definition of the flipped classroom. One big takeaway. The students do homework at school. Preview at home, practice at school.

Highlights

- A self-regulated flipped classroom approach was proposed
- The approach helped students effectively schedule their out-of-class time.
- An experiment was conducted in an elementary school math course.
- The approach improved the students' learning achievement, self-efficacy and self-regulation.
- The approach helped the students determine learning goals and performance.

Education Implication

A flipped classroom is an instructional strategy and a type of blended learning that reverses the traditional learning environment by delivering instructional content, often online, outside of the classroom. It moves activities, including those that may have traditionally been considered homework, into the classroom. In a flipped classroom, students watch online lectures, collaborate in online discussions, or carry out research at home while engaging in concepts in the classroom with the guidance of a mentor.

In the traditional model of classroom instruction, the teacher is typically the central focus of a lesson and the primary disseminator of information during the class period. The teacher responds to questions while students defer directly to the teacher for guidance and feedback. In a classroom with a traditional style of instruction, individual lessons may be focused on an explanation of content utilizing a lecture-style. Student engagement in the traditional model may be limited to activities in which students work independently or in small groups on an application task designed by the teacher. Class discussions are typically cantered on the teacher, who controls the flow of the conversation.[1] Typically, this pattern of teaching also involves giving students the task of reading from a textbook or practicing a concept by working on a problem set, for example, outside school.

The flipped classroom intentionally shifts instruction to a learner-centered model in which class time explores topics in greater depth and creates meaningful learning opportunities, while educational technologies such as online videos are used to 'deliver content' outside of the classroom. In a flipped classroom, 'content delivery' may take a variety of forms. Often, video lessons prepared by the teacher or third parties are used to deliver content, although online collaborative discussions, digital research, and text readings may be used. It has been shown that the ideal length of the video lesson to be is eight to twelve minutes.

Conclusion

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 21st Century employers are looking for in new employs. The flipped classroom model is becoming a popular way to increase the interactivity of the instructional format. When using the flipped classroom model, there is more effort needed on the part of both learners and instructors. Flipped classrooms also redefine in-class activities. In-class lessons accompanying flipped classroom may include activity learning or more traditional homework problems, among other practices, to engage students in the content. Class activities vary but may include: using math manipulatives and emerging mathematical technologies, in-depth laboratory experiments, original document analysis, debate or speech presentation, current event discussions, peer reviewing, project-based learning, and skill development or concept practice. Because these types of active learning

allow for highly differentiated instruction, more time can be spent in class on higher-order thinking skills such as problem-finding, collaboration, design and problem solving as students tackle difficult problems, work in groups, research, and construct knowledge with the help of their teacher and peers.

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