**Flipped Classroom and Learning Strategies**

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**Abstract**: This paper seeks to answer the research question "How does the flipped classroom affect students' learning strategies?" In e-learning research, several studies have focused on how students and teachers perceive the flipped classroom approach. In general, these studies have reported pleasing results. Nonetheless, few, if any, studies have attempted to find out the potential effects of the flipped classroom approach on how students learn.

This study was based on two cases: 1) a business modelling course and 2) a research methodology course. In both cases, participating students were from information systems courses at Dalarna University in Sweden. Recorded lectures replaced regular lectures. The recorded lectures were followed by seminars that focused on the learning content of each lecture in various ways.

Three weeks after the final seminar, we arranged for two focus group interviews to take place in each course, with 8 to 10 students participating in each group. We asked open questions on how the students thought they had been affected and more dedicated questions that were generated from a literature study on the effects of flipped classroom courses. These questions dealt with issues about mobility, the potential for repeating lectures, formative feedback, the role of seminars, responsibility, empowerment, lectures before seminars, and any problems encountered.

Our results show that, in general, students thought differently about learning after the courses in relation to more traditional approaches, especially regarding the need to be more active. Most students enjoyed the mobility aspect and the accessibility of recorded lectures, although a few claimed it demanded a more disciplined attitude. Most students also expressed a feeling of increased activity and responsibility when participating in seminars. Some even felt empowered because they could influence seminar content. The length of and possibility to navigate in recorded lectures was also considered important. The arrangement of the seminar rooms should promote face-to-face discussions. Finally, the types of questions and tasks were found to affect the outcomes of the seminars.

The overall conclusion with regard to students' learning strategies is that to be an active, responsible, empowered, and critical student you have to be an informed student with possibilities and mandate to influence how, where and when to learn and be able to receive continuous feedback during the learning process. Flipped classroom can support such learning.

**Keywords:** Flipped classroom, learning strategies, active learning, responsibility, empowerment

## 1. Introduction

Traditional university teaching and learning is brought into question on a regular basis. For many years, the teaching paradigm has been to lecture to students in lecture halls. Indeed, the focus continues to be on the teachers, with students being expected to sit and listen to them. Critiques of this approach have claimed that it encourages passivity in students and serves to maintain the knowledge retention rate at a minimum level (McCarthy & Anderson, 2000; Hake, 1998). Some of the approaches that challenge the traditional teacher-centered paradigm can be labelled "active learning" (Kvam, 2000; Prince, 2004). One such active learning approach is the "flipped classroom", also called the "inverted classroom". The flipped classroom approach is described as "multimedia lectures being recorded so students can view them out of class and at their own pace" (O'Flaherty & Philips, 2015:85). In-class time is used to work "through problems, advance concepts, and engage in collaborative learning" (Tucker, 2012:82). The main idea is to optimize the time students spend with the teacher.

Several studies have stated that students and teachers perceive the flipped classroom approach as a positive experience (e.g. Galway et al, 2014; O'Flaherty & Philips, 2015). Other studies have indicated that it can increase student performance (e.g. Mason et al, 2013; O'Flaherty & Philips, 2015). However, to our knowledge, few, if any, studies have attempted to find out the long-term effects of the flipped classroom approach on students' learning strategies. Therefore, this paper seeks to answer the research question: How does the flipped classroom affect students' learning strategies?

## 2. Theory

A strategy is a high-level plan to achieve a goal under conditions of uncertainty (Freedman, 2013). By learning strategies, we mean ways that are developed or adopted by students in order to facilitate learning and attain learning goals.

> "Learning strategies are used by students to help them understand information and solve problems. A learning strategy is a person's approach to learning and using information. Students who do not know or use good learning strategies often learn passively and ultimately fail in school." (University of Kansas, 2015)

According to Warr et al (1999:355), "there is considerable evidence that certain learning strategies are associated with better academic performance and that interventions can modify strategies and improve learning". Thus, it may be a good idea to explicitly reflect on learning strategies. Everyone has a learning strategy, whether it is conscious or not. When we learn in daily life (e.g. how to operate a new mobile phone), we apply some kind of approach. We could read the manual, work by trial and error, consult friends or try something else. In an educational situation the need for a more conscious and effective strategy is more obvious than in daily life, because you have to learn in order to pass assessments.

Students learn in different ways. This is commonly called learning or cognitive styles. According to Pashler et al (2009) "individuals differ in regard to what mode of instruction or study is most effective for them", accordingly they have different learning styles. There are several learning style models, for example Kolb's experiential learning model (Kolb, 1985), Barbe et al's Learning modalities model (Barbe et al, 1979), Neil Fleming's VAK/VARK model (LdPride, n.d.), and more. The models identify various styles and dimensions that are typical for certain kind of learners. We have chosen to shortly describe two different models that we believe is somewhat typical. First, the VAK/VARK model state that learners are mainly of four types: visual, auditory, reading-writing preference, and kinesthetic or tactile. This model or similar models are quite common when learning styles are discussed. According to LDPride (n.d.) most learners (65%) are visual and rather few (5%) are kinesthetic. The second model is Kolb's model. In this model learning is seen as a circular process as follows (1) a concrete experience (2) reflective observation (of the experience) (3) abstract conceptualization (from the reflection) and (4) active experimentation (where the learner applies what was learned). The experimentation can be the start of a new circle where acquisition of abstract concepts is contrasted to practical experiences. As a learner you can belong more or less to the different sectors of the Kolb learning circle in terms of doing vs watching or thinking vs feeling.

Even though there is some criticism against the learning style models (Coffield et al, 2004) it is obvious that students have different strategies when learning and that these strategies derive from different preferred learning styles. In this study we have not analyzed the learning styles of the students when carrying out the focus group interviews. We have just tried to find out how they have perceived how the flipped classroom approach has affected their learning strategies.

The link from learning strategy to actual learning is made via pedagogy. Teachers apply pedagogical methods in order to support students' learning. Pedagogical approaches can vary in many ways, but can be classified as either teacher centered or student centered, and as either active or passive learning. Ramsden (1995) distinguished between three theories of teaching that are also applicable to learning:

1. Teaching as telling through transmission

2. Teaching as organizing student activity
3. Teaching as making learning possible.

Theory 1 demonstrates a teacher-centered approach and theory 2, a process/organizational- centered approach. According to Ramsden, neither is appropriate for effective learning. Obviously, theory 3 is what Ramsden recommended. This theory presupposes that learning is something that is carried out by the student, although the teacher can support the learning process.

> "Theory 3 looks at teaching and learning as two sides of the same coin. Teaching is comprehended as a process of working cooperatively with learners to help them change their understanding. It is making the learning possible. Teaching involves finding out about students' misunderstandings, intervening to change them, and creating a context of learning which encourages students actively to engage with the subject matter." (Ramsden, 2003: 114)

This is indeed very much what the flipped classroom approach is about. As shown below, it is easy to see that a great deal of what students say about their experiences is in line with Ramsden's quote.

The flipped classroom is considered as a subgroup of student-centered learning and active learning (Baepler et al, 2104; Pierce & Fox, 2012; Wilson, 2013). It is also called the flipped course, inverted classroom or inverted learning (Tolks, 2014; Conner et al, 2014; Mason et al, 2013). The term "flipped classroom" is a concept that has shown up in the scientific literature since around 2011 (one hit in the search engine Summon). According to Wikipedia, the history of the flipped classroom started in the 1980s with "peer instruction". The main idea of "peer instruction" is to "coach instead of lecture" (Mazur, 1997).

Several studies reported that students perceive the flipped classroom as a positive learning experience, with an increase in motivation and self-perceived knowledge, and also performance (e.g. Mason et al, 2013; Galway et al, 2014; Schultz et al, 2014; Tune et al, 2013).

> "…most students had a favorable perception about the flipped classroom noting the ability to pause, rewind, and review lectures, as well as increased individualized learning and increased teacher availability." (Schultz et al, 2014)

Factors that may contribute to improved performance, along with positive attitude, and motivation, are student-mediated contact with the course material prior to classes, benchmark and formative assessments administered during the module, interactive class activities, and the well-integrated use of technology (Pierce & Fox, 2013; Rowe, 2013).

Thus, many studies have focused on the performance effect of the flipped classroom, whilst even more have focused on how students perceive the flipped classroom itself (see above references). In summary, these studies have praised the flipped classroom approach. They found that it increased students' performance, albeit not by much. As for students' perceptions of the flipped classroom, all of these studies concluded that students perceive the flipped classroom to be better than traditional teaching methods. From our findings, the reasons for this have mainly to do with the active dimension of the flipped approach.

In our literature study, however, we could not find any studies that have explicitly dealt with the long-term effects of the flipped approach. How does the flipped classroom affect the learning habits of students? Do they get some input about how to change their learning activities and attitudes in general? We could not find a model that supports the learning strategy aspect; thus, we used the findings of our literature study and themes that seemed to be relevant with regards to our research question. In this way, we established a list of themes, as below.

- Mobility (Janz et al, 2012)
- Repetition (Schultz et al, 2014)
- Formative feedback (Patanwala et al, 2014; Tune et al, 2013)
- Seminars and the order of lectures and seminars (Pierce & Fox, 2012)

- Responsibility (Pierce & Fox, 2012; Bishop & Verleger, 2013)
- Empowerment (Thomas & Velthouse, 1990; Flumerfelt & Green, 2013)

We believe that of these six themes the first four are quite clear, whereas the two last, responsibility and empowerment might need some explanation.

Responsibility means that students take responsibility for their learning. Pierce & Fox (2012) state: "In the flipped classroom, the responsibility and ownership of learning is transferred from the teacher to the students through participation in interactive activities." Responsibility can also mean that student divide tasks between each other in such a way that all students in a group take learning goals into consideration in an equal way (Bishop & Verleger, 2013).

We refer to student empowerment as including four dimensions: meaningfulness, competence, impact and choice (Thomas & Velthouse, 1990). To be empowered in the classroom is not the same as in business. The main idea in an educational context is that students learn more and better when they are empowered. We can see a clear connection to active learning since students are able to be more active and learn more as they gain empowerment. Even if it is not the same as in business, it is obvious that a more empowered student will have a different relation to the teacher than a less empowered.

## 3. Method

This study is qualitative and uses focus-group interviews as the data collection method (Rabiee, 2004). The answers were qualitatively analyzed, with the focus of effect being on students' learning strategies.

Initially, we carried out a literature study to find the relevant categories on which to base our interview. We used Summon and Google Scholar as search engines and combined "flipped classroom", "learning strategies", and "effects" as search terms in various combinations and forms. We collated our findings in a table that included: title, author and publishing year, as well as purpose, method, conclusions and abstract. From the table, we selected 27 papers that may relate to the research question. Four of these were literature reviews.

We used the case study approach to examine two flipped courses: 1) a business modelling course and 2) a research methodology course aimed at first- and second-year information systems students at Dalarna University in Sweden. Recorded lectures replaced regular lectures. The recorded lectures were followed by seminars where the learning content of each lecture was focused in various ways. First, the students had to answer a number of questions and submit the answers before the seminars. They also had to submit in advance any questions they wanted to have discussed during the seminars. Second, they were given tasks to carry out during the seminar. For the business modelling course, students were supposed to model various aspects of a fictive organizational case, such as goal analysis and problem analysis. For the research methodology course, the students had to read selected parts of an undergraduate thesis to identify such research methodology aspects as strategy and data collection method used. For the latter course, they also had to present their answers to the questions during the seminars.

### 3.1 Course 1: Business modelling

The structure of the recorded lectures and seminars was based on a textbook by Göran Goldkuhl and Annie Röstlinger, "Förändringsanalys, arbetsmetodik och förhållningssätt för goda förändringsbeslut" (1988). The Swedish word "Förändringsanalys" is not directly equivalent to "Business modelling", but it is close enough. The students had to write down the answers to questions and hand them in before the seminar. The entire course was based on a case study of a winter sports hotel. As a basis for questions and tasks the students were given a thick description of the hotel and its business situation. For example, lecture 2 was about goal analysis. Here, the students had to answer three general questions and carry out three tasks before the seminar. The questions were: a) What is a suitable vision for the hotel? b) How can this vision be operationalized to reach effective goals? c) What could be the consequences of a "bad" goal formulation? The tasks that had to be carried out were: a) write a list of goals and convert it into a goal graph for the hotel, b) identify goal conflicts, if any, and c) write a list of the hotel's strengths and convert it into a strength graph.

After the discussion of the questions the students were expected to analyze a situation, write a list of goals and organize them hierarchically according to the method. The discussion of the questions took place in class, whilst the exercises took place in two groups of 20 students (each group was half a class).

### 3.2 Course 2: Research methods

The structure of the recorded lectures and seminars was based on a textbook by Briony Oates, "Researching Information Systems and Computing" (2006). The students had to answer questions in writing and hand them in before the seminar. Lecture 4 was about data collection. Here, there were three questions for each of the four data collection methods described in Oates' book. For interviews, the questions were: a) What is the data collection method interview? b) How do you plan and conduct interviews? c) How do you evaluate the data collection method interview? The final question for each seminar was always: Is there anything else in the chapter that you want to discuss during the seminar?

After the discussion of the questions, the students were expected to analyze a chapter in an undergraduate thesis that corresponds to the theme of the seminar. After 45 minutes they were expected to present their findings. In so doing, they processed the content of the textbook chapters in a number of ways. The seminar discussions took place in groups of 10 students.

### 3.3 Focus group interviews

A few weeks after the final seminars, we arranged two focus group interviews for each course, with 6 to 10 students in each group. First, we asked open questions on how the students thought their learning strategies had been affected. Following these, we asked more specific questions, which were based on the model described below. Finally, we discussed any problems and negative effects the students had encountered.

The model used for the focus group interviews was mainly based on the findings of the literature study. We also inserted a few general items, such as "what problems did you experience?" The questions were:

- Have your views on how to learn been affected by the flipped classroom approach?
- How is this different from what you are used to?
- What role does mobility play in learning?
- What role does the opportunity to repeat lectures play?
- What role does formative feedback play?
- What role do the seminars and the order of lectures and seminars play?
- Do you feel more responsible for your own studies? If yes, how?
- Do you feel empowered? If yes, how?
- What problems have you encountered?

We recorded the interviews and transcribed them. When reading the transcripts, we summarized the answers of the categorized questions and also made notes about reflections not specifically related to the categories. Even if we focused on the aspect of how learning strategies were affected, we also noted other interesting reflections.

### 4. Results and analysis

In this section we compiled the outcome of the focus group interviews and sorted them according to the question groups. We merged some of the groups, however, because they appeared to cover the same topics.

### 4.1 The seminars

The seminars are needed as confirmation, acknowledgement and endorsement of the learning process before the examination. Formative feedback is meant to support learning during the course in order to make it more effective (see below).

Being present during seminars was perceived as useful. According to some students: "I want to hear what the others say. Students can have different views. Someone's opinion can reinforce yours or you might even

change your view. It can help just to get an explanation or hear an example", "To hear others' opinion is good and not just think for yourself, or get on the wrong track."

Some students expressed satisfaction with the presentations in course 2. They claimed that if you knew you had to present, even in a small group, you were extra motivated to do it properly and to prepare in order to know what you were supposed to talk about.

How the seminars were arranged was considered important. In course 1, some seminars included the entire class of 30 students and, in the second course; there were not as many active exercises during the seminars. From the answers of the first course we found out that the size of the group and the shape of the room were considered important. Students thought it was not as easy to participate in the discussions when they involved the whole class. Furthermore, sitting in a regular lecture room did not promote contact during discussions. In the second course, seminar classes were split into groups of 10 to 12 students. In addition, we used a room that allowed the students to sit around a table. There were no comments about group size or shape of room among students on the second course.

Both courses included regular weekly procedures with regard to the distribution of recordings and questions, which took place on Monday, and seminars, which were held on Wednesday or Thursday. Some students mentioned that it was good to establish the habit of doing the same thing every week, so that each week was the same. "You knew what to expect."

Students stated: "The arrangement is important. It became more interesting", "You had to find out for yourself." "You need a concrete purpose to learn." Thus, the seminar approach can provide the basis for interaction, responsibility and control. It is particularly suited to an active learning environment.

### 4.2 Recorded lectures, repetition and mobility

The possibility of watching/listening to recorded lectures was considered useful. In particular, it was seen to promote activity. The students claimed they worked more. However, as one student put it: "Just because it is a lot of work it does not have to be bad."

Some of the recorded lectures were recorded using a tool that saves files in mp3 format. This made it possible to just listen to the lectures without having to watch them. Some students used this facility to listen to the lectures while washing up, exercising or doing things where they could listen to, rather than watch, the lecture.

As indicated below, the possibility of navigation within the recording was considered important. The students experienced lectures recorded with two different tools; both of them were built on MS PowerPoint presentations, but only one of them provided an opportunity to easily retrieve a particular slide. This was mentioned by several students as being important, because they could go back to where they were or repeat a particular slide without much effort.

Repetition was promoted by the recorded lectures. Students could watch what they liked as many times as they liked, especially when they found it hard to understand some of the taught material. The length of the recorded lecture was considered important. It should definitely not be longer than 20 or 30 minutes. One student said: "It is better to have many short recordings than a few long ones.

It should also be easy to pause and to retrieve the recorded lecture from the point where you paused.

Regarding mobility, it was obvious that the students watched and listened to the lectures in many ways and in many places, including on the bus, on the sofa or at the kitchen table. Several students said that the opportunity to be able to choose the time and place was important and made it easier to study.

Thus, one can conclude that mobility, navigation, and file format all support students' control of when and where they can study. In turn, this gives them the opportunity to turn responsibility into control and empowerment.

### 4.3 Formative feedback

The confirmation aspect took several forms. First, during the seminars, students wanted to know if their interpretation of the material was relevant. It was also considered useful to listen to the various ways in which the other students expressed their answers to the questions. And, even if a student had misinterpreted a question, the discussion about this question made the student happy, because it meant that his/her interpretation could be corrected. In course 2, students related several times to another (not flipped) course and complained that this other course did not include the opportunity to focus on key aspects from the beginning and to correct misinterpretations during the course.

Formative feedback was considered important by all interviewees. "You know more of where you stand", "I have got used to this."

### 4.4 Responsibility

As there were no scheduled lectures, students felt they had to take responsibility by deciding themselves when to watch (or listen to) the recorded lecture. Some students also said that they felt more responsible for finding additional material relevant to the seminar questions.

Here are a few quotes that demonstrate the responsibility dimension: "You have to be prepared when you go to the seminar. If not you feel stupid", "You create habits about finding out things for yourself and not just get it served."

Students took more responsibility than they usually did in terms of preparing for seminars, being active during seminars, creating presentations and presenting with fellow students.

### 4.5 Empowerment

The interviewed students felt that they had more control, because they had to take responsibility to prepare themselves for the seminars in a more active way than they were used to. "If you take responsibility you get control." We interpreted the students' answers as if the flipped approach made them more active and in control. "You know that your answers affect the seminar. This is an opportunity. But it is the tasks and questions that make it possible." In this way, the seminars were arranged so that the students were given a sense of control and empowerment. However, the success of the seminar was also dependent on the students' planning before the seminar. "You can plan your studies better you can use your time better. If you have self-discipline", "It is more flexible. You can choose for yourself." So the freedom to prepare for the seminars and to be able to influence the content of seminars gave some students a feeling of control and empowerment.

Our interpretation of the findings identified a connection between responsibility and control. One student commented: "More responsibility, yes. It is like education-on-demand." By this, she meant that questions from students could affect the contents of the seminar.

The students could also use the situation to act within and take decisions about the work of the group during the seminars. The presentations provided one such opportunity. "It is a pleasant feeling to have contributed to the group's work. It makes a difference to have experienced that."

The interviewed students claimed to have more control over their learning process. We consider this to be a sign of student empowerment.

### 4.6 Problems

We included one question that was dedicated to finding out about any problems the students encountered during the course. We also tried to relate to problems during the discussions about the other questions.

Several students said that "self-discipline is necessary" when taking a flipped course. Some students felt that if a lecture was scheduled, then it was easier to follow that schedule rather than having to allocate time to watch recorded lectures. Another aspect mentioned was that the lectures actually provide contact with the teacher. "You cannot ask the teacher when you do not understand something in the recorded lecture. This is easier when you attend a traditional lecture." Whilst this point of view was not supported by many students

interviewed, some of them did agree. Another quote indicated a similar view: "Those who feel uncomfortable in taking responsibility are not pleased with the flipped approach."

For most students the seminar approach was new. Some did not appreciate it. Some of the critical comments made regarding the seminars were: "It was difficult to formulate questions for the seminars", "Not always interesting to listen to the other students' answers", "Some talk too little, some talk too much", "It was unusual at first to answer questions, but you got used to it." A comment from course 1 was about the character of the questions and tasks: "The seminars with just theoretical questions were not as effective as those where you had to do something."

In the second course everyone participating in the seminar also had to participate in the presentation. These presentations caused some negative feelings. One student said: "In the beginning I felt uncomfortable to talk in front of the other students". Later on, the same student said that she got used to it and came to appreciate it because she felt she had to make a good presentation and, to do that, she had to read up on the subject.

In summary, the problems expressed by the students were related to their unfamiliarity with the flipped approach.

**5. Discussion and conclusions**

In this section we set out to discuss and answer the research question: "How does the flipped classroom affect students' learning strategies?" By learning strategies we mean students' approach to learning and using information. Our theoretical model includes six themes presented in section 2 "Theory".

Our results show that, in general, most of our students thought differently about learning following their experiences of the flipped classroom concept, especially with regard to the need to be more active. Most students enjoyed the mobility, flexibility and accessibility aspects of recorded lectures, although a few claimed that they demanded a more disciplined attitude.

With regard to the recorded lectures, their length and the opportunity to navigate around them were considered important. The arrangement of the seminar rooms should promote face-to-face discussions. The types of questions and tasks were found to affect the outcomes of the seminars. Questions and tasks that support active learning were considered more effective than simply reading texts. The explicit reflections during the focus group interviews on the importance of questions and tasks demonstrated a critical awareness of the importance of relevant tasks for learning.

The interviewed students expressed a feeling of increased activity and responsibility when participating actively in seminars. Some even felt empowered, because they could influence the content of seminars (impact) and choose for themselves when and how to study (choice). This shows that the flipped (seminar-based) approach provides the basis for interaction, responsibility and control. Thus, it works well in an active learning environment and has the potential to affect students' learning strategies.

As for the connection to learning styles, we can see that the mobility aspect where students can listen to and watch lecture videos opens for visual, auditory and even kinesthetic students, since they can choose for themselves where and how to take part of the recorded lectures. On the other hand, seminars might be more suitable for auditory students, who are more for listening and talking. Again a seminar gives more opportunities for students to suggest both content and form, than a traditional lecture, which might benefit the visual learner.

Relating to Kolb's circular process where concrete and abstract conceptualization interacts we can conclude that when a course include both practical and theoretical dimensions the interaction between the concrete and abstract parts is easier. The consequence of this could be that students with different preferences might "join" the circular process where they feel most comfortable. In both our courses we had practical and theoretical exercises in parallel, which supports both learning styles and offers more than one way to enter the learning circle.

Either way, when we relate learning styles to learning strategies, we can see that students with different learning styles can adapt their learning strategies in a flipped classroom context. The reasons are the dimensions related to active learning which gives the student an opportunity to begin their learning process where he/she feels most comfortable, visual-auditory-kinesthetic or doing-watching/feeling-thinking.

The formative feedback used in seminars has an effect on students' learning strategies in terms of: 1) helping them to decide which key issues in the course material should be discussed and 2) having their own interpretations reviewed during the course. This is also a vital part of the overall goal for higher education, to cultivate a critical mind. This was not part of our initial research question, but as the project continued we noticed that the flipped design of our courses also supported a critical approach as a result of the following aspects: The use of class time. We have not made a systematic comparison with a "traditional" lecture based course, but the students were better prepared before the seminars than they would have been before a traditional lecture, since they knew they had to participate actively in the seminars. A mandatory question for each seminar was what problems they perceived when watching/listening to the lectures and formulating questions. Even though some students found it hard to be critical, this way to problematize promoted a critical view not only regarding the content but also regarding the educational approach.

To conclude, we found that the flipped classroom approach affected our students' learning strategies with regards to the dimensions in our model. We can conclude that to be an active, responsible, empowered, and critical student you have to be an informed student with possibilities and mandate to influence how, where and when to learn and be able to receive continuous feedback during the learning process. Flipped classroom can support such learning.

## References

Barbe, W.B., Swassing, R.H., and Milone Jr, M.N. (1979). *Teaching Through Modality Strengths: Concepts and Practices*, Zaner-Blosner, Columbus.

Bishop, J.L. and Verleger, M.A. (2013) "Flipped classroom: A Survey of the Research", *120th ASEE Annual Conference and Exposition*, June 2013, pp 23-216.

Coffield, F., Moseley, D., Hall, E., and Ecclestone, K. (2004) Learning styles and pedagogy in post-16 learning. A systematic and critical review, Retrieved August 5 2015 from
http://sxills.nl/lerenlerennu/bronnen/Learning%20styles%20by%20Coffield%20e.a..pdf

Conner, N.W., Stripling, C.T. Blythe, J.M., Roberts, T.G., and Stedman, N.L.P. (2014) "Flipping an Agricultural Education Teaching Methods Course", *Journal of Agricultural Education*, Vol 55, No 2, pp 66-78.

Flumerfelt, S. and Green, G. (2012) "Using Lean in the Flipped Classroom for At Risk Students", *Educational Technology and Society*, Vol 16, No 1, pp 356-366.

Freedman, L. (2013) *Strategy – A History*, Oxford University Press.

Galway, L.P., Corbett, K.K., Takaro, T.K., Tairyan, K., and Frank, E. (2014) "A novel integration of online and flipped classroom instructional models in public health higher education", *BMC Medical Education*, Vol 14, No 1, pp 181.

Goldkuhl, G. and Röstlinger, A. (1988) *Förändringsanalys, arbetsmetodik och förhållningssätt för goda förändringsbeslut*. Studentlitteratur, Lund.

Hake, R.R. (1998) "Interactive-engagement versos traditional methods: A six-thousand-student survey of mechanics test data for introductory physics courses", *American Journal of Physics*, Vol 66, No 1, pp 64-74.

Janz, K., Graetz, K., and Kjorlien, C. (2012) "Building collaborative Technology learning environments", *SIGUCCS'12 Proceeding of the 40th annual ACM SIGUCCS conference on User Services*, pp 121-126.

Kolb, D. (1985) "Learning Style Inventory: Self Scoring Inventory and Interpretation Booklet", McBer & Company, Boston.

Kvam, P.H. (2000) "The Effect of Active Learning Methods on Student Retention in Engineering Statistics", *The American Statistician*, Vol 54, No 2, pp 136-140.

LDPride. (n.d.) *What are learning styles?,* Retrieved August 5, 2015 from http://www.ldpride.net/learningstyles.MI.htm#Learning%20Styles%20Explained

McCarthy, J.P. and Anderson, L. (2000) "Active learning techniques versus traditional teaching styles: two experiments from history and political science", *Innovative Higher Education*, Vol 24, No 4, pp 279-294.

Mason, G.S., Shuman, T.R., and Cook, K.E. (2013) "Comparing the Effectiveness of an Inverted Classroom to a Traditional Classroom in an Upper-Division Engineering Course", *IEEE Transactions on Education*, Vol 56, No 4, pp 430-435.

Mazur, E. (1997) *Peer Instruction: A User's Manual*, Prentice Hall, New Jersey.

Oates, B.J. (2006) *Researching Information Systems and Computing*, Sage, London.

O'Flaherty, J. and Philips, C. (2015) "The Use of flipped classrooms in higher education: A scoping review", *Internet and Higher Education*, Vol 25, pp 85-95.

Pashler, H., McDaniel, M., Rohrer, D., and Bjork, R. (2009) "Learning Styles – Concepts and Evidence", *Psychological Science in the Public Interest*, Vol 9, No 3, pp 105-119.

Patanwala, A., Erstad, B., and Murphy, J. (2014) "The effect of quizzes on student preparation prior to a flipped classroom", *Pharmacotherapy*, Vol 34, No 10.

Pierce, R. and Fox, J. (2012) "Vodcasts and Active-Learning Exercises in a "Flipped Classroom" Model of a Renal Pharmacotherapy Module", *American Journal of Pharmaceutical Education*, Vol 76, No 10, pp 1-5.

Prince, M. (2004) "Does Active Learning Work? A Review of the Research", *Journal of Engineering Education*, Vol 93, No 3, pp 223-231.

Rabiee, F. (2004) "Focus-group interview and data analysis", *Proceedings of the Nutrition Society*, Vol 63, pp 655–660.

Ramsden, P. (2003) *Learning to teach in Higher Education*, Routledge.

Riding, J.R. and Sadler-Smith, E. (1997) "Cognitive style and learning strategies: some implications for training design", International Journal of training and Development, Vol 1, No 3, pp 199-208.

Rowe, M., Frantz, J., and Bozalek, V. (2013) "Beyond knowledge and skills: The use of a Delphi study to develop a technology-mediated teaching strategy" *BMC Medical Education*, Vol 13, No 51, pp 1-8.

Schultz, D., Duffield, S., and Rasmussen, S.C. (2014) "Effects of the Flipped Classroom Model on Student Performance for Advanced Placement High School Chemistry Students", *Journal of Chemical Education*, Vol 91, No 9, pp 1334-1339.

Thomas, K.W. and Velthouse, B.A. (1990) "Cognitive Elements of Empowerment: An 'Interpretive' Model of Intrinsic Task Motivation", *Academy of Management Review*, Vol 15, No 4, pp 666-681.

Tucker, B. (2012) "The flipped classroom", *Education Next*, Vol 12, No 1, pp 82–83.

Tune, J.D., Sturek, M., and Basile, D.P. (2013) "Flipped classroom model improves student performance in cardiovascular, respiratory, and renal physiology", *Advances in Physiology Education*, Vol 37, No 4, pp 316-320.

University of Kansas (2015) *Learning Strategies. University of Kansas - Center for Research on Learning,* Retrieved August 5 2015 from http://www.kucrl.org/sim/strategies.shtml.

Warr, P., Allan, C., and Birdi, K. (1999) "Predicting three levels of training outcome", *Journal of Occupational and Organizational Psychology*, Vol 72, pp 351-375.