

## **FLIPPED LEARNING IN PHYSICAL EDUCATION: WHY AND HOW?**

OVE ØSTERLIE

Faculty of Teacher and Interpreter Education, Norwegian University of Science and  
Technology, Oslo, Norway

### **INTRODUCTION**

This chapter introduces a way of organizing learning activities in the school subject Physical Education (PE) called flipped learning. The method consists of, in short terms, that the students prepare at home, before the PE class, watching a video explaining key topics in the next PE class. This way they come to class better prepared and more motivated for participating in the practical PE class, and they achieve a better learning outcome. This is a method which originates in the USA but which has now spread to the rest of the world. The method is quite new but even so, in 2014 only 12% of all American teachers had never heard of it; and school administrators now expect new teachers to know how to flip their classrooms prior to completing their certification process (Project Tomorrow & Flipped Learning Network [FLN], 2015). This calls for the method of flipped learning to be addressed, not only in America, but also worldwide. The first part of the chapter explains what flipped learning is, and why this is a teaching method for the future and how the method can be applied to the subject PE. In the second part of the chapter, we look at a few challenges in the process of applying the method and finally there are some conclusive comments.

### **WHAT IS FLIPPED LEARNING?**

Flipped Learning is 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 (Flipped Learning Network [FLN], 2014a).

A practical example of using the flipped model can be the following: The traditional method constitutes the teacher explaining new theory and showing some examples in front of a passive group of students. Then some time is set aside to do exercises, and then the homework is to do more exercises. There is not much room for students to have the explanations repeated if they are not understood, and this leads to a dilemma: Those who are in most need of practicing the new theory, now at home, are those who need help from the teacher the most. Those students, who understood the teachers' lesson well, do not have the same need for repetition at home. The idea in flipped learning is that the students will get the one-way-communicated lesson of new theory and examples at home where the lesson can be repeated as many times as necessary since the lesson is filmed and given to the students in the form of a video. In class, there is now more time for student-centered learning activities where the teacher takes the role of a facilitator, in contrast to traditional teaching, which is teacher-centered. In flipped learning

classrooms, the classes will more typically start with questions from the students. This way of organizing learning activities is known by various names in literature; “flipped classroom”, “flipped teaching”, “flipped education”, “blended teaching” and “mixt learning”. This teaching method is most accurately named and defined by FLN, and should not be confused with “distance learning” or “online teaching” where students also watch the teacher’s instructions on video, but without the teacher and student necessarily meeting each other physically during the learning process. In flipped learning, there is still student learning activities at school, with the teacher as an active supervisor, which is the backbone of the flipped learning method.

### **Flipped learning in school today**

The idea of recording lessons for the purpose of preparation for classes or as a way of repeating class content was first done systematically by Jonathan Bergmann and Aaron Sams in their chemistry class at high-school level (Bergmann & Sams, 2012b). The method is widely used at both university and college levels and in high schools, and to some extent in primary and secondary school (Flipped Learning Network [FLN], 2014b). Since 2007, studies on flipped learning have shown improved learning outcome in a variety of subjects and on various levels in school (e.g., Dill, 2012; Wilson, 2013). There are also reports of higher class attendance and perceived value of this method (e.g., McLaughlin et al., 2014) and increased student contentment (e.g., Talley & Scherer, 2013). However, Missildine et al. (2013) found that some students were not satisfied with the experienced extra work-load which the method entails. There has also been reports of teachers using flipped learning in PE, where the method is applied to explain rules as a part of introducing new games and activities (Bergmann & Sams, 2014), but until now there has not been any studies looking into the effects of flipping content in physical education.

### **WHY FLIPPED LEARNING IN PHYSICAL EDUCATION?**

Every generation has to adapt to the rapidly changing society. As teachers in school, we have to be open to new ways of teaching and not be resistant to new technology and ways of thinking about learning processes. In the words of Bergmann and Sams, “Flipping speaks the language of today’s students” (Bergmann & Sams, 2012b, p. 20). We can only be successful in the modern school if we are open to, and able to, adapt new technologies in our teaching. Project Tomorrow & Flipped Learning Network (2015) reports of an American survey with almost half a million students in grades 3-12, in which about 40% reported that they used online videos as additional assistance in their learning process

“The majority of polled students in grades 3-12 agreed with these statements on why using technology was helping them to learn: I am able to learn at my own pace (59 percent); I have more control over my learning (50 percent); and I am learning in a way that better fits my learning style (49 percent). While students are not known to endorse or encourage homework, 37 percent did agree with this statement: My learning does not stop at the end of the class period or school day; I can go home and continue learning after school.” (Project Tomorrow & Flipped Learning Network [FLN], 2015)

However, these are not the only reasons why teachers should start flipping PE classes.

### **Increased knowledge and competence**

In Europe there is a consensus that the subject PE is supposed to contain components of cognitive learning in a physical activity setting, and not just physically activate students through games, activities and sports (European Commission/EACEA/Eurydice, 2013). The examined national curriculums in physical education all seem to embrace the component of preparing the students for an active and healthy lifestyle in a life-long perspective, based on a cognitive and practically learned understanding of the relationship between physical activity and good health. This consensus seems to exist on several continents like in Asia (Nakai & Metzler, 2005), Australia (Australian Curriculum Assessment and Reporting Authority [ACARA], 2015), South-America (Chaves, Luguetti, & Carbinatto, 2011) and North-America (SHAPE America, 2013). This implies that theoretical knowledge is a part of PE that schools must not overlook (Solomon, 2006), if they are to fulfill the aims of the national and regional curriculums in PE. The teachers in secondary school, at least in Norway, do not pay enough attention to the theoretical parts of the curriculum. In fact, teachers in middle school consider giving the students competence about the human body more important than the teachers in secondary school (Jacobsen et al., 2001). In today's society, we have an increased focus on appearance, body and training, and this call for a higher competence about one's own body, physiology, health, training and development of a healthy body. The amount of information on websites and internet forums is rapidly increasing, and without competence, it is not easy to know what is true and what is not. Much of the information online is a way for companies to market products related to health and training. The students deserve accurate and validated information so they can sort the information brought to them from internet forums and social media. Many teachers want to give the students more knowledge about key concepts in PE without taking time from the practical activities in PE classes. We also know that young people do not exercise enough (Centers for Disease Control and Prevention [CDC], 2014). This is a global problem (World Health Organization [WHO], 2010). So how can we give the students more knowledge, and at the same time ensure that are still active in PE classes? One way to do this is to start using flipped learning in parts of the curriculum. If the method is used according to the guidelines, but still in a personalized way, the students will increase their competence in key topics without losing precious time of physical activity in PE classes. In an unpublished pilot study done in Norway in 2015 (200 students in secondary school), the students self-reported that they learned more in PE classes where flipped learning was used than in regular PE classes (Østerlie, 2015). Some of the best effects of the flipped learning method are that the students get to build new knowledge acquired in school in addition to the knowledge acquired at home, and this cognitive bridging is very effective in the learning process (Hattie & Yates, 2013). However, is there a connection between theoretical competence and motivation?

### **Motivation**

It is pointed out by Ryan & Deci (2000) that increased knowledge about a subject can increase the motivation to become actively involved in learning situations in this topic. This implies that students who follow a PE course using flipped learning will not just have a better foundation for reaching a higher level of knowledge of the topics in the PE classes, but they

might also become more motivated to learn more and in a more profound way. Hattie (2009) has linked feeling competent to motivation and deep learning, and argues that experienced knowledge gaps motivate us (Hattie & Yates, 2013). Roach (2014) links flipped learning to deeper learning, due to the increased understanding the videos give as preparation for class. As the video homework might help students get internal pictures of the upcoming activity in class, they might get a better visualization, and this enhanced visualization is linked to higher motivation (Manger & Wormnes, 2015). In the previously mentioned Norwegian pilot study, the students self-reported that their motivation for participating in PE classes increased when flipped learning was used in contrast to regular PE classes (Østerlie, 2015) and this is conceding with results from studies in other subjects (McLaughlin et al., 2014). A follow-up study is now looking deeper into how flipped learning in PE affects motivation both in a self-determination theory perspective (Deci & Ryan, 2002) and in a expectancy-value perspective (Eccles & Wigfield, 2002). Motivation and mastery provides a good foundation for learning (e.g., Hattie, 2009), and as PE teachers we have to provide our students with a learning environment that promotes both experienced mastery, motivation and learning in a holistic perspective. Both in content and in choice of teaching methods, PE teachers must have the students' mastery and motivation in mind. One of the main goals for PE is creating a life-long active and healthy life-style. For the students to achieve this, they need to experience mastering in PE in order to develop motivation, which will help them continue a life-long active and healthy lifestyle.

### **Fulfilling the curriculum and variation in content and methods**

Physical activity has always been at the core of PE classes. The tight bond between sports and PE has affected the way we plan and conduct learning activities in PE, and the “sportified” PE may limit the potential of the subject as a developmental asset for all (Säfvenbom, Haugen, & Bulie, 2014). Historically, training for military life has also been a part of PE (Phillips & Roper, 2006), and in Norway this was the reason for why PE became a school subject (Synnøstvedt, 1994). Today the history still colors the way we think about the subject as a way of training physical capacities and not much more. This has resulted in a practice which do not allow much time for theoretical learning or discussion. There is a lack of content knowledge in physical education (Dyson, 2014). Even if there have been several reforms of national curriculums, it seems that these reforms have a marginal effect on how the teaching is conducted both in Norway (Arnesen, Nilsen, & Leirhaug, 2013), England and Wales (Curtner-Smith, 1999; Green, 1998). PE teacher education also fails to convince students to be untraditional and open-minded for new teaching methods and a more diverse content in PE, as the students' perceptions of PE are synonymous with sport in schools (Moen & Green, 2012). Dyson (2014) argues for a more holistic approach to physical education:

“Physical educators who teach the whole child advocate for a plethora of physical activity, skills, knowledge, and positive attitudes that foster healthy and active playful lifestyles....Physical education is much broader than just physical activity, and we harm the future potential of our field if we adopt a narrow agenda.” (Dyson, 2014, p. 144).

Flipping parts of the PE classes can bring us closer to the goal of teaching our students the whole subject curriculum. We also want the students to see the links between theoretical knowledge about the body, health and training and their own level of activity and life-style. It is important to learn that theoretical and practical competence is merged and not supposed to be seen as separate elements. If we succeed in this, we have come far in teaching the core concepts of PE to our students. Flipped learning is not a method that will overtake the entire teaching done in PE, but will function more as a supplement to the existing teaching. Just the effect of using a more diverse set of teaching methods has a positive impact on students' motivation for, and physical activity level in, PE classes (Gao, Oh, & Sheng, 2011). Ward (2013) reports that in USA we now see that PE teachers are beginning to be held accountable for the students' learning outcome based on the national curriculum (SHAPE America, 2014). This clearly indicates the importance of changing towards a more holistic teaching approach in PE, where knowledge is put on the agenda as this also is a part of the curriculum and thus an expected learning outcome. Activating the students physically with sports and games is not enough; they must also acquire knowledge in PE, both practical and theoretical!

### **Increased level of activity**

As a PE teacher, you have many opportunities to film colleagues or students performing different games, activities or practicing techniques. Try making a video where you and a colleague show and explain the basic rules of basketball for middle-graders, or more advanced tactical deliberations you want to teach on a higher level. If the students watch these videos before class, you will experience that you have a more homogeneous group when it comes to understanding the class content and learning goals, and you can start immediately with the practical activity as there is no, or just little, need for explaining it to the students. Taking into account that the method itself can raise the motivation for participation, and that you can have more time for activity in every class, we see that flipped learning is a method of great potential for a higher level of physical activity in PE.

### **Improved student-teacher and student-student relationships**

It has been observed that using the method flipped learning will bring the teacher closer to his/her students and allows teachers to get to know their students better (Bergmann & Sams, 2012b). This is because you spend considerably more time interacting with your students, rather than conducting teaching in the traditional manner in a classroom or in a circle in the gymnastics hall. PE teachers normally have more interactions with their students than teachers do in subjects conducted in traditional classrooms, but we are always welcoming more interaction and new ways of interacting with our students. The better the relationship between the teacher and the student, the better the learning outcome is (Hattie, 2009). The flipped class also facilitates greater student-student engagement than more traditional non-flipped classes because more time is allocated to cooperative assignments (Berg, Ibrahim, Magaster, & Salbod, 2015).

### **Transparency and status of the subject today and into the future.**

There is also the matter of transparency. Many parents feel little or no connection with the content in school and this can be a breeding ground for misunderstandings and prejudices. “Flipping changes the way we talk to parents” (Bergmann & Sams, 2012b, p. 30). When parents get the chance to watch the PE homework together with their children, they do not only get an insight into your teaching and the class content, they also get an opportunity to participate in their children’s learning process, and they become educated on the topic themselves (Bergmann & Sams, 2012b). When parents can share the school’s expectations and involve themselves in a supporting way in the students’ homework it has a positive effect on learning (Hattie, 2009). School reforms are implemented worldwide at irregular intervals and these reforms are followed by a battle between different subjects over their importance and position in school. PE does not, in Norway at least, have a strong position and is often seen more as a recreational subject than a subject where learning processes are conducted (Jacobsen et al., 2001). Physical education teacher education (PETE) also currently maintains a relatively weak position (Collier, 2006). Putting learning, where learning is understood as a holistic process where cognitive and motoric learning is melted together, on the agenda in PE is an important part of raising the status of the PE subject in the modern school.

### **HOW TO FLIP LEARNING IN PHYSICAL EDUCATION?**

It is important to point out that the backbone of this method is still the learning that happens in school, between the students and between the students and the teacher. The videos that the students use for preparation for the PE lessons are used to increase their motivation for participating and to give the students a deeper understanding and a better learning outcome. It is also important to evaluate the content in your practical PE lessons so that the students can fulfill the aims in the curriculum in a way that creates motivation for a lifelong healthy life style. The method of flipped learning is a way of teaching that can enrich both your lessons and the subject PE.

#### **What will you flip?**

First, you have to analyze the subject curriculum for your classes. Find suitable topics where you feel that some form of teaching in front of the class would be useful, or where you feel that this topic should be taught in more detail or with other means than physical activity. If you think, “I really should have explained this to the students” or “I wish we had more time to talk about this topic” you have a well-suited topic for flipped learning. Examples from the Norwegian subject curriculum in PE are the aims: “*explain why physical activity is important in everyday life*” (after 7<sup>th</sup> grade) and: “*practice and explain the basic principles of exercise and training*” (after 10<sup>th</sup> grade) (Kunnskapsdepartementet, 2015). These aims cannot be addressed with physical activity only as they are competence aims where the students need to be challenged cognitively to acquire the desired knowledge. This is a perfect example of a situation where flipped learning is a good supplement to your existing teaching methods. Make a video where you explain your students, in your own way, why physical activity is important

in everyday life (the 7<sup>th</sup> grade aim). This may even require several videos. Your students will then see the assigned video as homework, and you can discuss the content in the following class in between physical activity that coincides with the video content. This way, the students will get first-hand experience with the content in the video, and they will achieve a deeper understanding and will improve the learning outcome for this competence aim. Breaking the main topics into smaller topics is always a good idea because this makes it easier to ensure that the videos are not too long or have too much content.

### **Who will make your videos?**

You have to decide if you want to make your own videos or use videos found online or made by your colleagues, or a combination. The recommended length of the videos is less than 15 minutes, and less than 10 is even better (Bergmann & Sams, 2012b). If you cannot break your topic into small enough units, it is better to make two videos of 8 minutes than one of 16 minutes. You have to keep this in mind when planning the content for each topic. In general, several videos for each topic are better than one or two long videos. This way, updating content or videos in a topic is also easier as you can change one short video and not the one, long video for the topic.

### **How to make the videos?**

It is recommended to attend a one- or two-day flipped learning workshop followed by a one-day training on screencasting. Once a teacher has learned the basics, proficiency and efficiency come through practice. The general rule of thumb is to allow 30 minutes to create a 10-minute video (Bergmann & Sams, 2012a). There are several tools and methods for making videos. One method is to use a tool grabbing your computer screen. This way you can use a PowerPoint presentation, figures, photos, videos or sketches when explaining what you want to teach the students. This way you just explain what you see on your screen and this is what the students will see in the video. Online tools like “screencastomatic” (<https://screencast-o-matic.com>) and “Jing” (<https://www.techsmith.com/jing.html>) are simple to use and the basic pack is free of charge. If you want to be able to edit, add text or animations, you will have to use a more sophisticated tool like Camtasia Studio (<https://www.techsmith.com/camtasia.html>), which is not free of charge. This tool also grabs your screen, or part of your screen, but gives you more opportunities to edit your takes including adding sound, text and more. The best way is to start simple and increase the level after some time using the method (Bergmann & Sams, 2012b). It is recommended that you also grab an image of yourself whilst explaining in the video. For this purpose, you use the computer’s webcam or an external webcam. All tools mentioned above will include the webcam if chosen in the program.

### **Where to place your videos so that your students can access them?**

Some teachers create a YouTube channel and upload all videos to this channel to create easy access for the students. Some teachers use the school’s learning platform like “itslearning”,

“Fronter”, “moodle” or “Blackboard” and some use “Google Docs” or “Drop Box”. There are also more specific flipped learning platforms, like “Campus Inkrement” in Norway, which allows you to insert quick-questions or quizzes in between videos. For this purpose, Google Forms also works. If you can access the students’ responses to questions during homework, it will give you the advantage of knowing ahead of class what parts of the topic the students generally had trouble understanding. It is necessary that you instruct your students where to log on, where to find the homework and how to watch the videos and respond to any questions. This way you can make sure that all, or at least the majority of the students, will conduct the homework. If students do not have internet access at home, teachers have made DVD’s with the course homework videos. It is all about finding a rational way that is suitable for you as a teacher and your students.

### **Mastery learning**

The flipped PE classes can very well be conducted in a mastery learning way. In this context, mastery learning is that each student move forward in the curriculum content whenever they are ready, not depending on the progression of the whole class. For a period, students can choose their own topic for the PE lesson based on activity sheets or goals made by the teacher. They are assigned suitable homework and can individually or in groups conduct practical activity in the PE-lessons. When they master one topic, they move on to the next. This way, the students are taking more control over their own learning process with the teacher as an active facilitator and supervisor. The mastery-learning-environment is shown to be an environment where the students learn even more (Hattie, 2009), and the students will get more motivated when the physical education class has elements of self-determination (Erdrvik, Øverby, & Haugen, 2014; Lonsdale, Sabiston, Raedeke, Ha, & Sum, 2009; Vallerand, 2007). “Flipping allows for real differentiation” (Bergmann & Sams, 2012b, p. 28) and the positive effect of the flipped class is most pronounced for students with lower grade point averages and for female students (Gross, Pietri, Anderson, Moyano-Camihort, & Graham, 2015). How to conduct the mastery flipped classroom is thoroughly described in *“Flip Your Classroom : Reach Every Student in Every Class Every Day* (Bergmann & Sams, 2012b).

Formative assessment is very important in the learning process in school (Hattie, 2009). Flipping some parts of your PE course gives you a good opportunity to provide more personalized feedback and evaluation through organizational guides, work-sheets or goal-forms that has a list of objectives, corresponding videos, reading from the textbook and activities. These evaluations will also be based on more of the curriculum and not just on performance in activities and sports conducted in PE classes.

### **Concluding comments**

You will learn that there is not one way to flip a class, and that you constantly have to modify your classes. It is when you are able to personalize your classes that you will be most successful (Bergmann & Sams, 2012a).

“Once again the message is clear—school leaders, teachers, librarians and students are increasingly interested in flipped learning to transform the learning experience.



Administrators want their teachers to utilize this method of instruction. Educators and pre-service teachers want more professional development. Librarians and other media specialists need support to assist with implementations. Students continue to use video as their go to method of formal and informal learning, so why fight it?" (Project Tomorrow & Flipped Learning Network [FLN], 2015)

With these words, I wish you good luck exploring the teaching method Flipped Learning in Physical Education.

## REFERENCES

1. Arnesen, T. E., Nilsen, A. K., & Leirhaug, P. E. (2013). "Den læreplanen som ikkje kan tilpassast mi undervisning, finst ikkje.": vurdering og undervisning i kroppsøving etter kunnskapsløftet. *Tidsskriftet FoU i praksis*, 7, 9-32.
2. Australian Curriculum Assessment and Reporting Authority [ACARA]. (2015). *The Australian Curriculum: Health and Physical Education (F-10)*. Retrieved from <http://www.australiancurriculum.edu.au/health-and-physical-education/curriculum/f-10?layout=1>.
3. Berg, A., Ibrahim, H., Magaster, S., & Salbod, S. (2015). Flipping Over the Flipped Classroom. *Contemporary Issues in Communication Science and Disorders*, 42, 16-25.
4. Bergmann, J., & Sams, A. (2012a). Before you flip, consider this. *The Phi Delta Kappan*, 94(2), 25-25.
5. Bergmann, J., & Sams, A. (2012b). *Flip Your Classroom : Reach Every Student in Every Class Every Day*. Eugene: ISTE.
6. Bergmann, J., & Sams, A. (2014). *Flipped learning : gateway to student engagement*. Eugene, Or: International Society for Technology in Education.
7. Centers for Disease Control and Prevention [CDC]. (2014). *State indicator report on Physical Activity, 2014*. Atlanta: Division of Nutrition, Physical Activity, and Obesity Retrieved from [http://www.cdc.gov/physicalactivity/downloads/pa\\_state\\_indicator\\_report\\_2014.pdf](http://www.cdc.gov/physicalactivity/downloads/pa_state_indicator_report_2014.pdf).
8. Chaves, A. D., Luguetti, C. N., & Carbinatto, M. V. (2011). Physical Education in the Brazilian Educational Law and National Curriculum Guidelines. *International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering*, 5(5), 729 - 733.
9. Collier, C. (2006). Models and curricula of physical education teacher education. In D. Kirk, D. Macdonald, & M. O'Sullivan (Eds.), *The Handbook of Physical Education* (pp. 386-406). London: SAGE Publications Ltd.
10. Curtner-Smith, M. (1999). The More Things Change the More They Stay the Same: Factors Influencing Teachers' Interpretations and Delivery of National Curriculum Physical Education. *Sport, Education and Society*, 4(1), 75-97. doi:10.1080/1357332990040106
11. Deci, E. L., & Ryan, R. M. (2002). *Handbook of self-determination research*. Rochester, N.Y: University of Rochester Press.
12. Dill, E. M. (2012). The Impact of Flip Teaching on Student Homework Completion, Behavior, Engagement and Proficiency. *University of New England*.
13. Dyson, B. (2014). Quality Physical Education: A Commentary on Effective Physical Education Teaching. *Research Quarterly for Exercise and Sport*, 85(2), 144-152. doi:10.1080/02701367.2014.904155
14. Eccles, J. S., & Wigfield, A. (2002). Motivational beliefs, values, and goals. *Annual review of psychology*, 53(1), 109-132.
15. Erdvik, I. B., Øverby, N. C., & Haugen, T. (2014). Students' self-determined motivation in physical education and intention to be physically active after graduation: The role of perceived competence and identity. *Journal of Physical Education and Sport*, 14(2), 232-241. doi:10.7752/jpes.2014.02035

16. European Commission/EACEA/Eurydice. (2013). *Physical Education and Sport at School in Europe*. Retrieved from Luxembourg: [http://eacea.ec.europa.eu/education/eurydice/documents/thematic\\_reports/150en.pdf](http://eacea.ec.europa.eu/education/eurydice/documents/thematic_reports/150en.pdf)
17. Flipped Learning Network [FLN]. (2014a). Definition of Flipped Learning. Retrieved from <http://flippedlearning.org/domain/46>
18. Flipped Learning Network [FLN]. (2014b). *Extension of a review of flipped learning*. Retrieved from <http://flippedlearning.org/domain/46>
19. Gao, Z., Oh, H., & Sheng, H. (2011). Middle School Students' Body Mass Index and Physical Activity Levels in Physical Education. *Research Quarterly for Exercise and Sport*, 82(1), 145-150.
20. Green, K. (1998). Philosophies, Ideologies and the Practice of Physical Education. *Sport, Education and Society*, 3(2), 125-143. doi:10.1080/1357332980030201
21. Gross, D., Pietri, E. S., Anderson, G., Moyano-Camihort, K., & Graham, M. J. (2015). Increased Preclass Preparation Underlies Student Outcome Improvement in the Flipped Classroom. *CBE life sciences education*, 14(4), ar36. doi:10.1187/cbe.15-02-0040
22. Hattie, J. (2009). *Visible learning : a synthesis of over 800 meta-analyses relating to achievement*. London: Routledge.
23. Hattie, J., & Yates, G. C. R. (2013). *Visible Learning and the Science of How we Learn*. Florence, KY, USA: Taylor and Francis.
24. Jacobsen, E. B., Moser, T., By, I. Å., Fjeld, J., Gundersen, K. T., & Stokke, R. (2001). L97 og kroppssøvningsfaget – fra blå praktbok til grå hverdag. *Elevenes og lærerens erfaringer knyttet til den nye læreplanen i kroppøving. Hovedrapport, 2*.
25. Kunnskapsdepartementet. (2015). *Læreplan i kroppøving (KRO1-04)*. Retrieved from <http://www.udir.no/kl06/kro1-04/>.
26. Lonsdale, C., Sabiston, C. M., Raedeke, T. D., Ha, A. S. C., & Sum, R. K. W. (2009). Self-determined motivation and students' physical activity during structured physical education lessons and free choice periods. *Preventive medicine*, 48(1), 69. doi:10.1016/j.ypmed.2008.09.013
27. Manger, T., & Wormnes, B. (2015). *Motivasjon og mestring : utvikling av egne og andres ressurser* (2. utg. ed.). Bergen: Fagbokforl.
28. McLaughlin, E. J., Roth, T. M., Glatt, M. D., Gharkholonarehe, A. N., Davidson, M. C., Griffin, A. L., . . . Mumper, J. R. (2014). The Flipped Classroom: A Course Redesign to Foster Learning and Engagement in a Health Professions School. *Academic Medicine*, 89(2), 236-243. doi:10.1097/ACM.0000000000000086
29. Missildine, K., Fountain, R., Summers, L., & Gosselin, K. (2013). Flipping the Classroom to Improve Student Performance and Satisfaction. *Journal of Nursing Education*, 52(10), 597-599. doi:10.3928/01484834-20130919-03
30. Moen, K. M., & Green, K. S. (2012). Physical education teacher education in Norway: The perceptions of student teachers. doi:10.1080/13573322.2012.719867
31. Nakai, T., & Metzler, M. (2005). Standards and Practice for K-12 Physical Education in Japan. *Journal of Physical Education, Recreation & Dance*, 76(7), 17-22. doi:10.1080/07303084.2005.10609307
32. Phillips, M. G., & Roper, A. P. (2006). History of physical education. In D. Kirk, D. Macdonald, & M. O'Sullivan (Eds.), *The Handbook of Physical Education* (pp. 123-140). London: SAGE Publications Ltd.
33. Project Tomorrow, & Flipped Learning Network [FLN]. (2015). *Speak Up 2014 National Research Project Findings: Flipped Learning continues to trend for third year*. Paper presented at the The School Superintendents Association's National Conference on Education
34. Roach, T. (2014). Student perceptions toward flipped learning: New methods to increase interaction and active learning in economics. *International Review of Economics Education*, 17, 74-84. doi:10.1016/j.iree.2014.08.003

35. Ryan, R. M., & Deci, E. L. (2000). Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions. *Contemporary Educational Psychology*, 25(1), 54-67. doi:10.1006/ceps.1999.1020
36. SHAPE America. (2013). *Grade-Level Outcomes for K-12 Physical Education*. Reston, VA Retrieved from <http://www.shapeamerica.org/standards/pe/upload/Grade-Level-Outcomes-for-K-12-Physical-Education.pdf>.
37. Solomon, M. A. (2006). Learner cognition. In D. Kirk, D. Macdonald, & M. O'Sullivan (Eds.), *The Handbook of Physical Education* (pp. 226-241). London: SAGE Publications Ltd.
38. Synnøstvedt, K. E. (1994). *Skolefaget kroppsøving : fagets bakgrunn og utvikling 1848-1925 : en lære- og fagplanhistorisk studie i norsk allmueskole og folkeskole*. Retrieved from Oslo: <http://www.nb.no/nbsok/nb/4a4daf113d2b7b8733b78ac861432286.nbdigital?lang=no>
39. Säfvenbom, R., Haugen, T., & Bulie, M. (2014). Attitudes toward and motivation for PE: who collects the benefits of the subject? doi:10.1080/17408989.2014.892063
40. Talley, C. P., & Scherer, S. (2013). The Enhanced Flipped Classroom: Increasing Academic Performance with Student-recorded Lectures and Practice Testing in a "Flipped" STEM Course. *The Journal of Negro Education*, 82(3), 339-347. doi:10.7709/jnegroeducation.82.3.0339
41. Vallerand, R. J. (2007). Intrinsic and Extrinsic Motivation in Sport and Physical Activity: A Review and a Look at the Future *Handbook of Sport Psychology* (pp. 59-83): John Wiley & Sons, Inc.
42. Ward, P. (2013). The Role of Content Knowledge in Conceptions of Teaching Effectiveness in Physical Education. *Research Quarterly for Exercise and Sport*, 84(4), 431-440. doi:10.1080/02701367.2013.844045
43. Wilson, S. G. (2013). The Flipped Class. *Teaching of Psychology*, 40(3), 193-199. doi:10.1177/0098628313487461
44. World Health Organization [WHO]. (2010). *Global recommendations on physical activity for health*. Retrieved from [www.cdc.gov/physicalactivity/downloads/pa\\_state\\_indicator\\_report\\_2014.pdf](http://www.cdc.gov/physicalactivity/downloads/pa_state_indicator_report_2014.pdf)
45. Østerlie, O. (2015). *Omvendt undervisning i kroppsøving på ungdomsskolen*. NTNU. Unpublished.