

اثر التعلم المقلوب ونمط شخصية الطالب في تحصيل طلبة الصف الخامس في اللغة الانجليزية

د. نوره محمد العنزي*
د. رامي علي ابو صعيك*
أ. د. جبرين عطيه حسين*

الملخص

هدفت الدراسة إلى معرفة أثر استخدام التعلم المقلوب في تحصيل طلبة الصف الخامس في اللغة الانجليزية، وأثر نمط شخصية الطالب في ذلك والتفاعل بينهما تكونت العينة من (50) طالباً من مدرسة الادرسي الثانوية للبنين في الرصيفة في الأردن في الفصل الثاني 2015/2014 قسموا عشوائياً إلى مجموعتين: الاولى تجريبية (25) طالبا درسوا باستخدام التعلم المقلوب، الثانية ضابطة (25) طالباً درسوا بالطريقة الاعتيادية. ولتحقيق هدف الدراسة، قام الباحثون ببناء اختبار لقياس تحصيل الطلبة، ولمعرفة نمط شخصية الطالب طُوِّرَ مقياس للشخصية لتحديد نمط شخصية المجموعتين. أظهرت النتائج وجود فروق دالة إحصائياً لصالح المجموعة التجريبية التي درست بطريقة التعلم المقلوب، كما اظهرت عدم وجود فروق دالة إحصائياً على التحصيل تعزى إلى شخصية الطالب، وللتفاعل بين طريقة التدريس ونمط شخصية الطالب، وفي ضوء نتائج البحث قُدِّمَتْ بعض التوصيات منها تفعيل التعلم المقلوب في تدريس اللغة الانجليزية نظراً لفاعليته في التعليم.

الكلمات المفتاحية: التعلم المقلوب، نمط شخصية الطالب، التحصيل الأكاديمي، اللغة الانجليزية.

* الجامعة الاردنية.

* الجامعة الأردنية.

* الجامعة الهاشمية- كلية التربية- قسم المناهج والتدريس.

The Effect of Flipped learning and Student's Personality Trait on 5th Grade Students' English Achievement

Dr. Jebreen A. Hussain* **Rami A. Abu Sa'aleek***

Noura M. Elenzi*

Abstract

The aim of the study was to examine the effect of flipped learning on 5th grade students' English achievement and identify the effect of student's personality trait and interaction between the two variables. The sample of the study totaled (50) male students selected from Al -Adreesi Secondary School for Boys at Al -Rusaifa, Jordan in the second semester 2014\ 2015. The sample was divided into two groups .The first group was the experimental group which contained (25) students who were taught by using the flipped learning and the second group was the control group containing (25) students who were taught by using the traditional teaching method .To achieve the objective of the study, an English achievement test was developed to examine students' achievement and a personality trait scale was developed to identify students' personality traits in both study groups. The results of the study showed statistically

* Ministry of Education Jordan.

* Hashemite University Jordan.

* Jordanian University Jordan.

significant differences in favor of the experimental group taught by using the flipped learning. There were no statistically significant differences due to personality traits and the interaction between the instruction method and students' personality traits on students' English achievement. In light of these results, some recommendations were suggested.

Keywords: Flipped learning, Student's personality traits, academic achievement, English language

Introduction

The world is witnessing significant developments in all aspects of life, and teaching was influenced by these developments. It is impossible, then, that it remains as it was in the past; traditional and Out- of- date. Recognizing this, developed countries have worked on the progress of the teaching learning process on a systematic scientific basis and this requires revolutionizing school curricula and teaching methods mainly depending on conventional strategies.

Technology played a vital role in the educational process as the introduction of information and learning technologies to education is without doubt an effective way for improving the quality of teaching and learning. They are now employed in design, development, assessment and evaluation. The applied and intellectual interactions between the learners and the learning environment are an attribute of information and learning technology attention paid to technology by educational organizations, both in the developed and developing countries is a clear indicator of educational Advancement, and the progress of individuals and societies (Amer, 2007).

There are some important trends that the development process is based on ,such as the promotion of student's positive role in the learning process; his\ her ability to participate, inquire, and depend on himself; the positive interaction with the teachers, learning content, and peers in the classroom; the need to develop teaching strategies and styles; the employment of modern instructional methods based on the use of modern technologies in the educational process (Al Zain, 2006).

There is no doubt that the best learning and teaching is that which provokes motivation and curiosity; makes the teaching- learning process more interesting and viable while using a small portion of traditional

teaching and a lot of projects, conferences in a student \ not teacher centered learning and teaching process. With the increase use of modern technology in education, numbers of teachers wishing to adopt creative instructional methods is also increasing (Strayer, 2007).

One of the modern instructional strategies that is based on employing advanced technologies to activate the concept is the use of synchronous and asynchronous e- learning, blended learning, Webquest instructional strategies, virtual reality, and finally flipped learning (Al Khaleefa & Deyaa 2015).

Flipped learning is a modern teaching and learning technology that depends on the employment of several e- learning tools such as audio and visual software, video clips prepared by the teacher so as the students can watch and learn outside the classroom and capitalize on lesson time in assignmnts, activities and exercises work (Bergman & Sama,2012).

Educause (2013), a foundation specialized in supporting the use of effective adoption of technology in the teaching learning process, defined the flipped learning as an educational model working on reversing the teaching learning process so as an exemplary lecture is watched as homework while the learning activities pertaining to class content are worked in the class.

Flipped learning is one of the modern technological solutions to address the weaknesses found in traditional learning and to promote students' thinking skills. It is an instructional strategy that includes the use of technology to make benefit of education as that the teacher can spend more classroom time in interacting with students instead of lecturing. Students, on the other hand, watch short video clips showing the lectures at home, and the majority of classroom time is devoted to discussing the content in class under the teacher's supervision. According to modified Bloom Taxonomy, students' achievement falls in the lower level of the cognitive domain (knowledge acquisition and comprehension) at home

while focusing on the higher levels of the cognitive domain (application, analysis, synthesis and assessment) during class time (Brame, 2013).

The flipped learning strategy provides a unique combination between two of the learning theories that were seen as inconsistent, and these are the traditional learning and active learning (Bishop & Verleger, 2013). For the important role of technology and its important role in the learning process, two teachers at Yungergham sought in their study to identify the employment of technology in teaching students technical skills and to identify the benefits of using flipped learning in teaching them the required cognitive level and the effect of such instructional strategy in one of Spreadsheet introductory course in the university on students' course achievement and their attitudes towards the new instructional strategy. To achieve these objectives, a semi- experimental design was used based on the use of pre- posttests for the sampled subjects using flipped learning. The results of the study indicated that the use of technology in flipped learning was effective as it facilitated the learning process, increased students' learning motivation and made a difference in the learning process as a whole (Randall, Davics, Douglas , Dean and Nick, 2013).

Fulton (2012) postulated that the advantages of flipped classroom can be found in its ability to put students on the right learning track, help them complete their homework in the classroom, thus providing an invaluable time to focus on students with learning disabilities and to consider students' learning styles. It also enables teachers to develop learning material, to effectively and creatively transfer it to students in addition to the fact that using this instructional strategy increases student's achievement and their engagement in the learning situations.

Reviewing more than 30 previous articles published in the last 5 years examining the effectiveness of using flipped learning on students'

achievement and interactions, analyzing and assessing them, Bormann (2014) concluded that flipped learning provides an interactive learning environment that promotes students' achievement and thus may be an effective teaching strategy in the 21st century.

The Jordanian Ministry of Education acknowledged the importance of English, thus there was a strong emphasis on teaching it from the beginning of 1st grade instead of 5th grade in public schools. There was also a focus on developing English curricula to keep abreast with the modern teaching methods and technologies to help students acquire the different English language skills. English textbooks are now being taught to student supported by the use of instructional aids to assist teachers while teaching students effectively acquire English language skills.

Problem of the Study

The world is witnessing a huge scientific and technological revolution as the teaching learning process is no longer limited to knowledge and information transfer from the teacher to the student. Now, teachers are more and more called to find modern student- centered teaching methods and strategies while focusing at the same time on the positive interactions between students, teachers, learning content and learning technologies under the guidance of teachers. Flipped learning is seen as one of the modern teaching strategies focusing on students' use of learning technologies, employing them in their learning. Thus, flipped learning promotes interaction between students and teachers, between students and their classmates. Moreover, it is also one of the technical solutions to increase students' thinking skills and raise their academic achievement. This has led educators and researchers recognize the need for investigating the effect of using flipped learning on 5th grade students

English achievement as various studies, e.g. (Tucker,2012; Vaughan, 2014; Amer, 2007) have shown the effectiveness of this teaching strategy and recommended its use in the different school subjects as an effective method for promoting students' achievement.

In light of the above discussion, and starting from the need for developing teaching learning process, the urgent need for developing modern instructional strategies, to employ the new educational advancements that are accessible for both teachers and students nowadays, and due to the scarcity of Arabic studies examining the use of flipped learning in the teaching learning process, particularly the examination of using flipped learning on 5th grade students English achievement, the current study was an attempt to identify the effectiveness of using flipped learning teaching strategy on 5th grade students English achievement.

Purpose of the Study

The study sought to investigate the effect of flipped learning and the student's personality trait on 5th grade students' English achievement.

Research Questions:

- 1- Are there statistically significant differences in 5th grade students' English achievement due to the teaching strategy (flipped learning, traditional)?
- 2- Are there statistically significant differences in 5th grade students' English achievement due to student's personality trait (extroversion, introversion)?
- 3- Are there statistically significant differences in 5th grade students' English achievement due to the interaction between the teaching strategy and student's personality trait?

Hypotheses of the Study

The study tested the following hypotheses:

- 1- There is a statistically significant difference at ($\alpha=0.05$) in the mean scores of 5th grade students' English achievement due to the teaching strategy (flipped learning, traditional).
- 2- There is a statistically significant difference at ($\alpha=0.05$) in the mean scores of 5th grade students' English achievement due to the student's personality trait (extroversion, introversion).
- 3- There is a statistically significant difference at ($\alpha=0.05$) in 5th grade students English achievement due to the interaction between the teaching strategy and student's personality trait

Significance and Rational of the Study

- 1- The study encourages teachers to employ modern and new technological teaching strategies in English teaching.
- 2- The results reported in the current study may open new ventures for interested researchers as it is hoped that it may be a contribution in the educational research.
- 3- The study provides educational field with a teaching model employing flipped learning and this may help the educational decision makers generalize its use in Jordanian schools.
- 4- The study focused on the modern technologies to promote the use of digital learning among students.

Terminology and procedural definitions

Flipped learning: A student -centered modern technology teaching strategy, providing students with electronic content encompassing activities, drills and software containing images, instructional videos, PowerPoint software and websites that all help them learn the learning content at home

before coming to class. This teaching strategy allows learners acquire the learning content independently at the time found possible for him\ her. This allows teachers in turn to capitalize the classroom time interacting with students, working on homework, exercises, and completing assignments required by the learning content as students learn the new concepts and information in the material at home, having the freedom to review it as he\ she likes, and this motivates him\ her to learn.

Achievement: The academic level achieved by the students in learning a set of concepts, generalizations and language skills included in the textbook, and is measured by the score they obtain on the achievement test used to measure it.

Extroversion personality: The sociable personality of the student having a number of friends, likes to participate in social events, is not prone to reading, hyperactive, likes change, open, persistent, adventurous, optimistic, laughs a lot and irritable. The extroversion personality trait is measured in the current study as the score ranging between 26 and 34 obtained by the students on the scale developed and employed in the current study.

Introversion personality: The calm, withdrawal, contemplating personality with a few friends. Such personality trait prefers reading and studying, prone to be conservative, thoughtful, avoids interesting and adventurous events, accurately controls his\ her emotions, rarely aggressive, pessimist, and values the ethical and social standards. The introversion personality trait is measured in the current study as the score ranging between 17 and 25 obtained by the students on the scale developed and employed in the current study.

Limitations and Delimitations of the Study

- 1- **Spatial limitations:** The study was confined to Al- Edreesi Secondary School for Boys at Al Russaifa District, Jordan.
- 2- **Time limitations:** The second semester of the school year 2014\2015.
- 3- **Human limitations:** 5th grade students at Al- Edreesi Secondary School for Boys.
- 4- **Procedural limitations:** The study was confined to "You Should Play Sports " unit, one of the study units in the 5th grade English textbook. Also, the lessons were only presented using PowerPoint and educational images and videos given to students on a CD. The unit also contained learning activities and assignments, allowing independent learning at the time found suitable by students while having full freedom to complete exercises and drills leading to learning unit. The researchers developed a personality trait scale, and the results obtained are determined by the validity and reliability levels of the scale.

Theoretical Framework

Flipped learning is one of the modern teaching strategies focusing on employing the modern technologies to effectively use the concepts of e-learning. Such strategy entails two important components: the first is to take the lecture outside the classroom via the use of electronic media and the second is the practical implementation of assignments in the class (Educause, 2012)

While using flipped learning, learning takes place as teacher **uses** technology to transform the traditional learning environment based on the use of direct lecturing as homework, and the classroom time is effectively capitalized on active learning activities, preparing videos and sending them via the internet. Audio and visual tapes are prepared to be heard and

watched before classroom and this means that the classroom is fully dedicated to cooperative learning activities and assignments, thus allowing teachers to be a facilitator and a guide in the class, meaning that students are no longer passive recipients, but active participants in the teaching- learning process (Tucker, 2012).

Flipped learning has many advantages in the teaching -learning process including an effective employment of modern technology tools in the educational process, transforming the role of teacher from being the main source of information in class, to be **the** facilitator and motivator for learning. Moreover, it increases students' participation in the teaching-and- learning process to become a co- teacher, participant and researcher. It also urges students to adopt independent learning based on their own abilities and individual differences. Flipped learning gives shy students the opportunity to ask for repeating parts of the lesson several times and this means to effectively use the classroom time in productive activities. In addition, it provides an interesting and enjoyable learning environment to maintain students' attention, motivate them, and develop their higher order thinking skills such as critical thinking (Strayer, 2012).

Disadvantages of Flipped Learning

Despite the numerous advantages of flipped learning, some teachers indicated that it requires extensive and conscious preparation and vast experience many students lack. Furthermore, recording lectures or clips and preparing them requires time, effort and high skills. Moreover, the acquisition of high quality learning and teaching experiences from the internet, video clips is a hard task. The use of flipped learning is then an extra burden for the teacher and requires new teaching skills he\ she is unfamiliar with. In addition, students have never encountered such learning experiences

before, and this may indicate that they reject it as it needs much work at home and lesson preparation before classroom time (Al Khaleefa & Deyaa, 2015; Herreid & Schiller, 2013).

Literature Review

The researchers reviewed previous literature and studies pertaining to the use of the flipped classrooms and found that there is a paucity in previous studies in foreign and Arab countries, and this may be a strong rationale for the current study.

In one study, DeGrazia, Falconer, Nicodemus and Medlin (2012) examined the effect of flipped classroom on students' readiness during formal lecturing time and found that students reported more readiness level, comprehended more the learning content and were more prepared in the formal lecturing lessons.

In a similar study, Wagner, Laforge and Cripps (2013) studied the effectiveness of flipped learning strategy on electronic engineering students at Regina University in Canada and found that students were more motivated to learn the given topics and reported higher comprehension levels.

Strayer (2012) compared the students' performance in two study groups, the first was taught by using the flipped classroom strategy and the second was taught by using the traditional teaching method in one statistic introductory course. Several research instruments were employed in the study, including field observation and interviews. The results of the study indicated that students in the experimental group taught by using the flipped classroom were more open with respect to the adoption of this modern teaching strategy as an advanced instructional method.

In another study, Herreid and Schiller (2013) surveyed the perceptions of Members of National Center using case studies of science teachers investigate the extent to which the teachers they supervise the use of flipped learning in teaching science. 200 of the subjects of the study confirmed their use for flipped learning and provided persuasive reasons motivating them for such use : it provides adequate time for students to work on assignments while employing the available instruments and equipment in the science classroom, enable absent students to engage in academic assignments and activities by providing the chance to watch the lectures they missed , providing reinforcements, encouraging thinking inside and outside the classroom and increase students' interactions in the teaching- learning process.

Pedroza (2013) examined students' attitudes towards the flipped learning by designing an attitudes questionnaire administrated to 3 sections using flipped learning as a teaching strategy for 2 years. The questionnaire included statements describing mastery learning, social networks, video clips, self- learning and general questions addressing flipped learning. The study concluded that all students reported positive attitudes towards flipped learning as they described their experiences in flipped learning classes as interesting and enjoyable. 7% of the total students reported that they would not advise their friends of flipped learning, while 8% of them felt that flipped learning provides lesser interactions with the learning content compared to the traditional learning. The majority of students expressed their comfort in class in using self-learning activities in good time they desire. Moreover, they confirmed that flipped learning supported their preferred learning style, provided them with more opportunities to interact with their peers and the teacher in

productive active learning experiences while working on classroom assignments. Only 3% of these students reported that their motivation was decreased while 6% felt that this learning strategy improves their learning.

In the same vein, Talley and Schere (2013) investigated the use of flipped learning and attempted to identify its effect on students' achievement and tests performance in one university psychology introductory courses. The authors compared the performance of the students taught using by the flipped learning to those taught by using the traditional teaching. The results of the study reported an increase in academic performance and engagement in learning content for the students taught by using the flipped learning, and this resulted in an increase in university midterm and final tests performance.

In a similar study, Tune, Sturek, and Basile (2013) compared the achievement of students in one health science course taught by using flipped learning with those taught the same learning content using the traditional teaching method and found that students in the flipped learning course highly outperformed their peers in the traditional courses in health science achievement.

In another study, Mason, Shuman and Cook (2013) compared students' achievement and attitudes towards flipped learning with students' taught using by the traditional teaching in one mechanical engineering course. The authors found that the flipped learning strategy has encouraged students to practice problem solving skills individually and in groups. It enabled the teacher to cover more learning topics effectively compared to the traditional teaching method. The results of the study showed that students in the flipped classroom outperformed students in the control group, were more proficient in problem

construction and solving, were more satisfied with the learning experience, more interactive with the learning topics provided in class compared to their peers in the control group.

Vaughn (2014) investigated pre- service teachers' attitudes towards flipped learning as a teaching strategy to form an integrated classroom of millennium students. The results of the study indicated that the flipped learning classroom provides teachers with a set of effective learning technologies to be integrated and employed in their classes and encourages an active learning environment. The study concluded that flipped learning improves students' engagement, collaboration between students and their teachers and this enhances self- learning.

Findlay-Thompson and Mombourquette (2014) examined the effect of using flipped learning strategy on students' achievement and their attitudes in one business management introductory course at the University of Mount Saint Vincent. The design of the study was based on using various instruments (qualitative and quantitative) in data collection in three study groups: two represented the control groups and were taught using the traditional teaching method, while the third represented the experimental group and was taught by using the flipped learning strategy. The results of the study indicated that the achievement of the three groups of students was similar, indicating that there were no statistically significant differences. The authors reported inconsistent results in terms of academic achievement levels between the three groups.

In a similar study, McLaughlin, Griffin, Esserman, Davidson, Glatt, Roth, and Mumper (2013) reported identical results as the authors examined the effect of flipped classroom on students' achievement, their participation and their perceptions with respect to the use of such a teaching strategy in one

medical science course in two separate branches in one university. The study used a mixed -method design. Despite the fact that the quantitative results found that students preferred the flipped classroom strategy as it enabled them access various information before formal classes and supported learning activities in lectures The results pertaining to students' academic achievement were much similar for both study groups. By contrast, the qualitative data reported in this study in terms of flipped learning strategy effectiveness, the students confirmed its importance in supporting learning activities and their understanding of the presented learning topics.

Farah (2014) examined the effect of using flipped teaching strategy on 12th grade female students writing performance in the Applied Technology School in Abu Dhabi. The results of the study showed that flipping teaching strategy is considered an effective instructional tool having positive effects on 12th grade female students' performance in *IELTS*. The results pertaining to the questionnaire measuring students' opinions in terms of using this advanced teaching strategy reported positive attitudes among 12th grade female students as it integrates technology in traditional learning and that flipping learning is an acceptable teaching strategy among female students.

Al Zain (2015) aimed to identify the effect of the designed model used in flipped learning implementation. Another objective of the study was to study the effect of employing flipped learning strategy on the academic achievement of the Faculty of Education at Princesses Noura Bint AbdelRahman University. The sample of the study consisted of (77) female students at the university selected from special education and early childhood departments. The results of the study showed that flipped

learning was effective in increasing female students' academic achievement as they reported high results.

Summary of Previous Literature

The summary of previous studies can be stated as follows:

- Some studies have asserted the importance of flipped learning as they showed statistically significant differences due to the use of flipped learning as a teaching strategy. These included DeGrazia et al. (2012); Strayer (2012); Herreid and Schille, (2013); Pedroza (2013); Wagner et al. (2013); Tune et al. (2013); Mason et al. (2013); Randall et al. (2013); Talley and Scherer (2013) Vaughan (2014), Farah (2014); Al Zain (2015).
- Other studies did not show statistically significant differences due to the use of the flipped classroom and these included: Findlay-Thompson and Mombourquette (2014) and McLaughlin et al. (2013).
- Previous studies mainly focused on undergraduate student population (e.g. Strayer, 2012; Wagner et al. 2013; Tune et al. 2013; Mason et al. 2013; Talley & Scherer, 2013, McLaughlin et al., 2013; Findlay-Thompson and Mombourquette, 2014). Other studies such as Vaughan (2014) and Al Zain (2015) examined the perceptions of pre-service teachers towards the use of flipped classroom as a teaching strategy. Finally, Farah (2014) used a study population of secondary school female students.
- Some studies (e.g. DeGrazia et al. 2012; Wagner et al. 2013) investigated general perceptions and satisfaction towards the use of flipped learning.
- Previous studies examined the effectiveness of flipped learning in different courses such as statistics (e.g. Strayer, 2012), psychology (e.g. Talley and Scherer, 2013), mechanical engineering (e.g. Mason et al. 2013), business management (e.g. Findlay-Thompson and Mombourquette 2014). Many variables were examined in the studies using flipped learning as a teaching

strategy such as academic achievement (e.g. Al Zain, 2015), students' attitudes (e.g. Pedroza,2013), writing skills (Farah, 2014; Randall et al., 2014) which focused on using technology and its significant role in teaching students technological skills.

The Current Study

This study is one of the few studies that attempted to examine the effect of using the flipped learning and the student's personality traits on 5th basic stage grade students. Specifically, the current study investigated the effect of using flipped learning on students' English achievement as the authors found no previous studies- to their limited knowledge- that investigated the effect of flipped classroom and its effectiveness in promoting students' English achievement at the basic stage. Despite the fact that there are various studies that sought to examine the effectiveness of flipped learning in several school subjects, the use of such a teaching strategy and its effect on English achievement was not fully investigated, particularly in Arabic countries. Moreover, the results reported in foreign studies cannot be generalized to the Arabic culture as there are many cultural and social discrepancies between the two cultures.

The study benefited from previous studies in the following aspects:

- 1- Developing the study questions, purposes and defining the general framework of the study.
- 2- Adapting the learning material to be appropriately suited to the employment of flipped learning in teaching English.
- 3- Designing the basic steps for the flipped classroom teaching strategy.
- 4- Depending on the results reported in previous studies to be employed in explaining the results of the present study to suggest some recommendations.

Methods and Procedures

1-Design of the Study

The study design was based on the experimental approach to compare the achievement of the experimental group taught by using the flipped classroom and the control group taught by using the traditional teaching method. To measure students' personality trait, the descriptive survey design was employed.

2-Sample of the Study

The sample of the study totaled (50) 5th grade students selected using purposeful sampling procedures from Al- Edreesi Secondary School for Boys at Al- Rusaifa Educational Directorate in Jordan in the second semester of the school year 2014\2015. They were purposefully selected due to the fact that the school provided the necessary conditions (tools, equipment, devices, and facilities). The students were randomly assigned to two groups the first was experimental, containing (25) students who were taught by using the flipped learning strategy and the second was control containing (25) students who were taught by using the traditional teaching method.

Table (1) shows the distribution of the two study groups. **Table (1)**

The distribution of the two study groups based on study variables

Variable Level	Instructional Strategy		Student's Personality Trait	
	Flipped Learning	Traditional Learning	Introversion	Extroversion
No.	25	25	6	44

3-Materials of the Study

First: Learning Adapted Content based on flipped learning procedures

"You Should Play Sports " unit was selected from the 5th basic grade English textbook as it was suitable for achieving the objectives of the study, the study design and the developed learning activities. The behavioral objectives were prepared and stated. The material was developed to conform the use of flipped learning as a teaching strategy. The material contained the learning objectives and the teaching strategies. Moreover, the learning resources, instructional aids, assessment and evaluation models were developed and these totaled 4 lesson plans. The learning material was adapted to conform to the suggested learning activities in the flipped classroom while adhering to the standards stated in the textbook.

Several learning activities developed to teach the unit using the flipped learning were prepared and these included instructional videos from YouTube website and Power Point slides to present the learning material in an interesting and stimulating learning environment in addition to the use of pictures, written texts and worksheets as they are all very important in enriching the learning experience. The validity of the learning material was established by giving it with all the learning activities to 10 specialists in learning and information technology, English, instructional methods and measurement and evaluation at Al Hashemite University, University of Jordan, and Yarmouk University and some experts from the Jordanian Ministry of Education. Each of these experts was given a copy of the developed learning material and was asked to provide their opinions in terms of the clarity of the learning

material, accuracy, sequence, the appropriate use of sounds and colors, the suitability of the learning material background, the quality of writing. Moreover, they were asked to judge the adequacy of the linguistic content and its appropriateness. Based on the experts' remarks, which mainly focused on the learning material sequence, the harmony between the colors and language structure and their remarks were taken into consideration as some adjustments and adaptations were performed on the learning material and the final format of it was prepared. The instrument was also administrated to a pilot sample selected from the original sample of the study totaling (25) 5th grade students for three weeks. This was a measure of the learning material appropriateness of the study. The students were asked about the difficulties they encountered while working on the developed learning material, and to give their opinions in terms of the material which they found difficult for them. The pilot study subjects reported that the learning material was easy and interesting. Thus, it was finally prepared for use with students.

Second: The Achievement Test

To measure students' English achievement, Pre-Test , Post-Test was prepared. The test contained (20) multiple choice items covering all levels of the objectives and skills intended in the learning unit. An evaluation specification table considering the relative importance of the objective weights was prepared to establish content validity of the test. Each item was given one score (total score=20). The time for the completion of the test was set at (45 minutes) and this was based on the pilot study sample administration results. The achievement test was a pretest on students' previous knowledge related to the unit. This was a procedure to ensure the equivalence of the two study groups.

Validity of the Achievement Test

The validity of the achievement test was established by giving it to 10 specialists in learning and information technology, English, instructional methods and measurement and evaluation at Al Hashemite University, University of Jordan, and Yarmouk University and some experts from the Jordanian Ministry of Education. Each of these experts was given a copy of the developed achievement test which consisted in the first format of (25) items. They were asked to give their opinions in terms of language clarity and the item's ability to achieve the intended objectives. Each of these specialists was asked to make some suggestions, eliminating or adding items as appropriate. After taking their opinions into consideration, which were mainly related to the wording of some items, eliminating and adding items, the final format of the achievement test contained (20) items see (Appendix 1) to see the test in its final shape.

Reliability of the Achievement Test

After the validity of the achievement test was established, reliability of the achievement test was tested by administrating it to a pilot sample which consisted of (25) 5th grade selected out from of the original sample of the study. Cronbach alpha for internal consistency was employed to calculate the reliability coefficients. The value of Cronbach alpha of the test was (0.82) which is adequate for the scientific research objectives (Odeh, 2004).

The difficulty of the test items was calculated for each individual item after being administrated to a pilot sample using the following formula

$$\text{Difficulty coefficient} = \frac{X}{Y} \times 100\%$$

X= the number of correct responses on the item.

Y=the total number of respondents on the test items.

The difficulty coefficients for the test items were (25-78) which were acceptable values for the scientific research objectives. The best item difficulty coefficient is around (50%) (Odeh, 2004). Then, the discrimination coefficient for the items was calculated and was (20-39)- (Appendix 2) which were acceptable values for the scientific research objectives. The items reporting discrimination values of (1-19%) are weak, those with (20-39%) are acceptable, while those reporting more than (39%) item discrimination values are good (Al Kubaisi, 2007).

Third: Personality Traits Inventory

To identify student's personality trait, Eysenck, Eysenck & Barrett (EPQ-R, 1985) inventory was used. The scale consists of (100) items distributed on 4 domains: Extroversion- Introversion, Neurotic-Deductive, Psychotic- Non- Psychotic, and Lying. The current study employed the sub-scale of both Extroversion and Introversion, which were translated and adapted to the Jordanian environment. To achieve this purpose, the 17 items were selected and adapted to the Jordanian environment and 5th grade students' language level (vocabulary understanding) and was developed in a form maintaining the original form of the original inventory. The developed inventory contained 17 items indicating the extroversive student's personality trait while 2 items indicated to the introversive student's personality trait. To achieve this, the researchers developed the questionnaire indicating student's extroversive and introversive personality traits as they were asked to read the items carefully and put (√) around the item best describing his personality and (X) around the item not describing his personality traits. To reach the results of the personality trait inventory, the researchers developed a response key as items 1 2 3 4 5 6 7 8 10 11 12 14 15 16 and

17 describe students' with extroversive personality while items 9 and 13 describe students with introversive personality. To calculate the number of students with extroversive and introversive personalities, a score scale was developed as each item was given 2 points. The response scale indicates that each student scoring between 17 and 25 is introversive and each student scoring between 26 and 34 is extroversive. The following formula was used in scale development: the highest category-1 divided on the number of categories=2 divided on 2 and this equals 5. Thus, the level 1-1.5 indicates an introverted personality while higher than 1.5 indicates an extroverted personality.

Validity and Reliability of the Scale

Face validity was employed to establish the validity of the scale as it was given to 10 specialists in learning and information technology, English, instructional methods and measurement and evaluation at Al Hashemite University, University of Jordan, and Yarmouk University and some experts from the Jordanian Ministry of Education. Each of these experts was given a copy of the developed personality trait scale. In the preliminary format, it included 17 items and these were asked to give their remarks and opinions in terms of language clarity and the item's ability to achieve the intended objectives. Each of these specialists was asked to make any suggestions, eliminate or add items as appropriate. After taking their opinions into consideration, which were mainly related to the wording of some items, eliminating and adjusting items (Appendix 3), the final format of the scale included 17 items. The reliability of the scale was tested by administrating it to a pilot sample which consisted of (25) 5th grade selected out from the original sample of the study. Cronbach alpha for internal consistency was employed to calculate the reliability coefficient. The

value of Cronbach alpha of the test was (0.80) which is adequate for the scientific research objectives (Odeh, 2004).

Procedures of the Study

- The suitable tools and equipment for the intervention were prepared and these included: The preparation of the learning content based on flipped learning and teaching strategy put on a CD in addition to the learning activities, exercises and worksheets.
- The two groups (experimental and control) were purposefully selected, and the achievement pretest was administrated to check the equivalence of the two study groups, and then was scored to come up with the results.
- The students in the experimental group were provided with the experimental learning content, software, tools and equipped with a CD containing the learning activities, exercises, self -test questions to enable them to watch the learning material themselves at home. By contrast, the control group was taught using the traditional teaching method.
- The two groups of the study (experimental and control) were taught by the same teacher after the new teaching method using the flipped learning was explained to him.
- The teaching intervention lasted for 3 weeks as the classroom activities included working on activities, exercises and questions by the students under the teacher's supervision.
- The personality trait inventory was administrated to both study groups (experimental and control) and then analysis of the obtained data was performed.
- At the completion of the teaching intervention on both groups, the test was administrated, scores of data were collected and entered into the SPSS statistical package software to elicit results.

Design of the Study

The current study used the experimental design as two study groups (experimental and control) were randomly selected . The study used the following design:

O X O
O - O

O: is the pre-test for the two study groups.

X: the teaching intervention (flipped learning group)

-: the traditional teaching method.

Variables of the Study

First: Independent Variables

1- Teaching method .This contained two levels:

A- Flipped learning.

B- Traditional teaching.

2- Student's personality trait. This contained two levels:

A- Extroverted.

B- Introverted.

Second: The Dependent Variable

The direct achievement of 5th basic grade students in the English achievement test.

Statistical Analysis

SPSS statistical software was used for data analysis as the following statistical procedures were employed:

1- Means and standard deviations for the two study groups (experimental and control) performance on the two instruments of the study were calculated in addition to the use of t- test. To identify the differences between the two group's performance on the pre-post tests, ANCOVA was used.

2- Two -Way ANOVA was used to develop the results of the study.

Equivalence of the Study Groups

Equivalence of both study groups was checked in terms of the teaching strategy (flipped learning vs. traditional teaching) before the intervention was administrated. A pretest for students of both groups was administrated. Table (2) shows means, standard deviations, t- test values to identify differences in the pretest mean scores of the experimental group taught by using the flipped learning and the control group taught by using the traditional teaching.

Table (2)Means, standard deviations, t- test values for the two study groups (experimental, control) on the two study instruments

Group	N.	M	SD	t- value	Sig. .
Control	25	6.28	3.12	0.411-	*0.824
Experimental	25	6.64	3.08		

****Not significant at the significance level ($\alpha \leq 0.05$)***

Table (2) shows that t value was (-0.411) with a significance level of (0.824) which is insignificant at the significance level ($\alpha \leq 0.05$), meaning that both study groups were equivalent.

Results of the Study

Results pertaining to the first hypothesis of the study stating:

"There is a statistically significant difference at ($\alpha \leq 0.05$) in the mean scores of 5th grade students' English achievement due to the teaching strategy (flipped learning, traditional).

To test this hypothesis, means and standard deviations were calculated on the scores obtained by the two study groups (experimental, control) on the pre-post tests. Table (3) shows these results.

Table (3) Means and standard deviations of the two study groups scores according to the teaching method

Group	Achievement Test			
	Pre-test		Post-test	
	M	SD	M	SD
Experimental	6.64	3.08	9.88	3.14
Control	6.28	3.11	6.84	3.45

Modified means and standard errors of students' scores in the post-test for both study groups (experimental, control) were calculated after taking into consideration the pre-test scores of both study groups as a common variable as there was a variance in the posttest scores. Table (4) shows that.

Table (4) Modified means and standard errors of students' scores in the post-test for both study groups (experimental, control)

Group	Modified Means	Standard Error
Experimental	9.739	0.450
Control	6.981	0.450

To identify the differences in the means, ANCOVA was employed on the posttest scores as shown in table (5)

Table (5) ANCOVA results of the study sample scores on the Post-Test according to the teaching method

Source of variance	Total squares	Degrees of freedom	Squares means	<i>F</i>	Sig.
Common variable	284.447	1	284.447	56.278	0.00
Group	94.691	1	94.691	18.735	0.00
Error	237.553	47	5.054		
Total	4132.00	50			
Modified total	637.520	49			

As shown in table (5), and based on the results of ANCOVA for the post-test according to the group, it was found that *F* value was (18.735) and the statistical significance value was set at (0.00) and this was a significance at the significance level ($\alpha \leq 0.05$), indicating that there were statistically significant differences at the significance level ($\alpha \leq 0.05$) in English 5th grade students' achievement due to the teaching method used (flipped learning, traditional). As shown in table (5), the modified means for the experimental group post-test was (9.73) and this value was higher than the one reported in the control group (modified mean= 6.98).

Results pertaining to the second hypothesis of the study stating:

There is a statistically significant difference at ($\alpha \leq 0.05$) in the mean scores of 5th grade students' English achievement due to the student's personality trait (extroversion, introversion).

To test this hypothesis, means and standard deviations were calculated on the scores obtained by the two study groups (experimental, control) on the post-test in relation to the teaching method and the student's personality traits. Table (6) shows these results.

Table (6) Means, standard deviations for the two study groups scores on the Post-Test in relation to the interaction between the teaching method and student's personality trait

Student's personality trait	Teaching method	M	SD
Extroverted	Flipped learning	10.66	2.08
	Traditional	6.6	2.08
	Total	8.66	2.87
Introverted	Flipped learning	9.77	3.27
	Traditional	6.86	3.63
	Total	8.32	3.72
Total	Flipped learning	9.88	3.14
	Traditional	6.84	3.45
	Total	8.63	3.61

As shown in table (6), there were apparent differences in the mean scores of both study groups (experimental, control) due to the personality traits variable . To identify the significance of these differences, (Two-Way ANOVA) was used and table (7) presented the results.

Table (7) Two- Way ANOVA for the two study groups performance on the Post-Test according to the interaction between teaching method and personality trait

Source of variance	Total squares	Degrees of freedom	Squares means	F	Sig.
Personality	0.641	1	0.641	0.057	0.813
Teaching method	63.011	1	63.011	5.576	0.022
Interaction between teaching method and personality traits	1.571	1	1.571	0.139	0.711
Error	519.788	46	11.300		
Total	637.520	49			

As shown in table (7), the mean scores for the introversive students' performance in the control group was (6.66) which was almost similar to the mean scores for the extroversive students' performance in the control group (M=6.86). The mean scores for the introversive students' performance in the experimental group was (10.66) which was almost similar to the mean scores of the introversive students' performance in the experimental group (M=9.77). This means that there were no statistically significant differences at the significance level ($\alpha \leq 0.05$) as shown in table (6), indicating no substantial significant differences between the two study groups in relation to the student's personality trait.

These results mean accepting the second hypothesis of the study stating which says that *There is a statistically significant difference at ($\alpha \leq 0.05$) in the mean scores of 5th grade students' English achievement due to the student's personality trait (extroversion, introversion)*".

Results pertaining to the third hypothesis of the study stating:

"There is a statistically significant difference at ($\alpha \leq 0.05$) in 5th grade students' English achievement due to the interaction between the teaching strategy and student's personality trait (extroverted, introverted)".

Table (7) shows no statistically significant differences at the significance level ($\alpha \leq 0.05$) due to the interaction between the teaching method and the student's personality traits. Calculated F value was (0.139) at the significance level (0.711) and this indicates that there is no statistically significant interaction between the personality traits and the teaching method in affecting achievement. In other words, there is no combined effect for each of personality traits and teaching method on the students' achievement and this means that there is no statistically significant difference at the significance level ($\alpha \leq 0.05$) between the mean scores of both study groups (experimental, control) English achievement due to the interaction between the teaching method and the student's personality traits (extroverted, introverted).

Discussion and Recommendations

The first question of the study stated: *Are there statistically significant differences in 5th grade students' English achievement due to the teaching strategy (flipped learning, traditional)?*

The results of the study indicated that there were statistically significant differences between the students' English achievement means scores due to the teaching method uses, in favor of the experimental group students taught by using the flipped learning strategy. This result may be accounted for by the fact that teaching using flipped learning is one of the student-centered teaching method as it employs educational

videos watched by students at home before coming to the classroom. This enables teachers fully utilize the available time during the classroom to interact with students, work with them on assignments. Students learn the content and the majority of new concepts, information, principles, skills, theories, values included and presented using an e- learning tool containing images, sounds, and colors, and thus creating an interesting and enjoyable learning environment for students. They learned to use self paced learning at home, were fully free to progress in the learning activities, avoid the embarrassments found in class setting and its demands and in a limited time. Via the use of videos, PowerPoint, worksheets, and self- tests combined with providing learning experiences for students at the time they wish, all this has enabled students in the experimental group master the learning content, understand it and complete classroom tasks; their homework, required exercises which motivated them to learn and master the learning content. This was the reason why students in the experimental group outperformed their peers in the control group who were more familiar with the traditional teaching methods they experience daily in all school subjects.

Moreover, the flipped learning strategy may have put students on the right track in their learning experiences, helped them complete classroom tasks while being at school. This teaching strategy also provided teachers with invaluable time to focus more on students with learning disabilities and consider individual differences among students, providing average with adequate time to work on their tasks to master and comprehend the learning content. It may be due to the fact that such a teaching strategy considers students' individual differences, as each one of them has learned from the e- learning tools he\ she has in accordance with his\ her

individual abilities and readiness. He\ she possessed the learning material, can repeat it at any time found suitable for him\ her, review it as much possible as he\ she wants, can avoid the embarrassment he\ she may face in the classroom setting. This result may be attributed to the effective role flipped learning played in employing modern technology which has increased students excitement to review the learning content ahead on a daily basis. They were given invaluable opportunities to discuss and communicate with their peers and with the teacher at higher levels as compared to the traditional classroom setting. Utilizing flipped learning, excitement, enjoyment, and play experiences are accessible by using videos, PowerPoint, images and learning activities. All of the advantages have contributed in making students more open and engaged in learning material as the flipped learning classroom was able to meet students' needs and desires, promoted their motivation to learn , took them away from the routine environment found in the traditional teaching method they were more familiar with. This result is consistent with the results reported in various studies (e.g. DeGrazia et al. 2012, Herreid & Schiller 2013 ,Pedroza,2013 Wagner et al. 2013; Tune et al. 2013; Mason et al. 2013; Talley and Scherer ,2013; Randall et al, 2013; Vaughan,2014 ;Farah, 2014 & Al Zain, 2015), and was inconsistent with the results reported in other studies (e.g. Findlay-Thompson and Mombourquette, 2014 & McLaughlin et al. 2013) that reported that there is no statistically significant effect for the use of flipped learning on students' achievement.

The second question of the study stated: ***Are there statistically significant differences in 5th grade students' English achievement due to the student's personality trait (extroversion, introversion)?***

The results of the study found that there were no statistically significant differences between 5th grade students English achievement due to the personality trait (extroversion, introversion). This result may be due to the fact that students in the experimental group, despite the difference between them, were exposed to the flipped learning intervention enabling them to freely study the learning content on their own pace, unlimited times. May be, the intervention provided students with various e- learning tools (e.g. Videos, PowerPoint slides), learning activities, exercises which provided all students, regardless of their personality traits, an opportunity to comprehend and understand the learning material, master it and be more engaged in the accompanying activities. All this facilitated their learning content comprehension, eliminated the differences resulting personality traits. Moreover, the nature of the learning experiences found in the flipped learning (using various activities, technologies), what it provides of interesting, exciting and enjoyable learning experience (utilizing motion, sounds) have motivated students to learn the content. In addition, students' practices and interactions in the classroom with the learning content, the teacher and their classmates enhanced students' learning and their achievement regardless of their personality traits. Also and as students are more exposed to traditional teaching methods, and they are basically taught by using teaching methods lacking excitement, this may have eliminated the differences between them. For the first glance, there may be apparent differences in personality traits, but this does not necessarily be taken as a negative side, but it enhanced students' learning and achievement based on the personality traits. This implies that there are no substantial differences between the students' mean scores in English achievement in

both study groups (experimental, control) due to students' personality traits (extroversion, introversion)

The third question of the study stated: *Are there statistically significant differences in 5th grade students' English achievement due to the interaction between the teaching strategy and student's personality trait?*

The results pertaining to this question indicated that there were no statistically significant differences due to the interaction between the teaching method and the student's personality traits. This may be attributed to the fact that both teaching methods had no effect on students' personality traits. Also, student's personality trait had no effect on his achievement in both teaching methods either due to the fact that students are more familiar with the traditional teaching method; did not recognize that flipped learning provided them with new forms of learning experience, or the time allocated to flipped classrooms was inadequate to change their preferred learning styles. This may be attributed to that both teaching methods were perceived by students as close to their preferred learning styles, and thus, neither of the teaching methods has a statistically significant effect on students' personality traits. This result confirms that the used teaching method depends on students' personality traits in relation the achievement of English.

Recommendations

Based on the results reported in this study, the following recommendations were suggested:

- 1- Using flipped learning in English teaching as it has proven to be effective in increasing students' English achievement.

- 2- The Ministry of Education should encourage English teachers to employ the flipped learning in the teaching- learning process.
- 3- Providing adequate and effective training programs for teachers to master such an effective teaching strategy.
- 4- Similar future research investigating the effectiveness of flipped learning on students' English achievement in other grade levels based on students' gender and their attitudes towards this teaching strategy is needed.
- 5- Providing specialists in developing learning materials to be presented using such a teaching strategy.
- 6- Organizing training programs for teachers and students to acquire the needed skills to employ flipped leaning effectively.

References

- Al Khaleefa, H., & Deyaa, M. (2015). *Effective Teaching Strategies*, Cairo: Mutanabi library.
- Al Kubaisi, A. (2007) *Measurement and Evaluation : renovations and discussions*, Amman: Dar Jareer for Publishing and Distribution.
- AL Zain, H. (2015) *The Effect of Using flipped Learning Strategy on the Academic Achievement of Students in the Faculty of Education Princess Nora Girl Abdul Rahman University*. *The International Interdisciplinary Journal of Education*. 4 (1), 171-186.
- AL Zain, H. (2006) *Building Program for Graduate Studies Specialist (Education Technology) Faculties of Education for Girls in the Light of Contemporary Global Trends*, unpublished PhD Thesis, Princess Nora Girl Abdul Rahman University, Riyadh.
- Amer, T. (2007) *Education and E-School*, Cairo: Dar Al-Sahab for publication.
- Bergmann, J., & Sama, A. (2012). “The short history of flipped learning”, *Flipped Learning network*.
- Bishop, J. L., & Verleger, M. A. (2013). *The Flipped Classroom room: A Survey of Research*. 120th American Society for Engineering Education Conference & Exposition, June 23-26. Paper ID #6219
- Bormann, J., (2014). “Affordances of flipped learning and its effects on student engagement and achievement”, *Master Diss.*, University of Northern Iowa.
- Brame, Cynthia J. (2013). “Flipping the classroom”, *Vanderbilt University for Teaching*.
- DeGrazia, J. L., Falconer, J. L., Nicodemus, G., & Medlin, W. (2012). *Incorporating screencasts into chemical engineering courses*. Paper

presented at the ASEE Annual Conference & Exposition, Atlanta, USA.

-Educause (2012) available at:

http://www.educause.edu/search/apachesolr_search/Educause

-Educause (2013) available at:

http://www.educause.edu/search/apachesolr_search/flipped

Retrieved: 28/11/2014.

-Eysenck, S, Eysenck, H., & Barrett, P. (1985). A revised version of the Psychoticism scale. *Personality and individual Differences*, 6 (1): 21-29.

- Farah, M.(2014) The Impact of Using Flipped Classroom room Instruction on the Writing Performance of Twelfth Grade Female Emirati Students in the Applied Technology High School (ATHS). Master Diss . , The British University in Dubai,United Arab Emirates .

-Findlay-Thompson, S., & Mombourquette, P. (2014). Evaluation of a flipped classroom in an undergraduate business course. *Business Education & Accreditation*, 6(1) 63-71.

-Fulton,K. (2012). Upside down and inside out: Flip your classroom to improve student learning. *Learning & Leading with Technology*, 39(8) 12–17.

-Herreid, C. & Schiller, N. (2013). “Case Studies and the flipped classroom, *Journal of College Science Teaching*, National Science Teachers Association, 42(5) 62-64.

-Mason, G., Shuman, T., & Cook, K. , (2013). Comparing the Effectiveness of an Inverted Classroom room to a Traditional Classroom room in an Upper-Division Engineering Course. *IEEE Transactions on Education*, 56(4), 430-435. doi: 10.1109/TE.2013.2249066.

-McLaughlin, J., Griffin, L., Esserman, D., Davidson, C., Glatt, D., Roth, M., Mumper, R. , (2013). Pharmacy Student Engagement, Performance, and

- Perception in a Flipped Satellite Classroom. American Journal of Pharmaceutical Education, 77(9) 1-8.
- Pearson Education, Inc. (2013). “Flipped learning Model dramatically improves course pass rate for at-Risk students”, available at: www.Pearsonpd.com, Retrieved: 27/11/2014.
 - Pedroza, A., (2013). “Student perceptions of the flipped classroom- New Research”, available at <http://www.mediacore.com/blog/student-perceptions-of-the-flipped-classroomroom-new-research>.
 - Odeh, A. (2004) Measurement and Evaluation in the Teaching Process, Irbid: Dar Al- Amal for publication.
 - Randall S., Davics; Douglas L., Dean and Nick, B., (2013). “Flipping the classroom and instructional technology integration in a college- level information systems spreadsheet course”, Educational Technology Research and Development, 61(4) 563-580.
 - Strayer, J. (2012). How learning in an inverted classroom influences cooperation, innovation and task orientation. Learning Environments Research, 15, 171-193.
 - Strayer, J. (2007). “The effects of the classroom flip on the learning environment: a comparison of learning activity in a traditional classroom and a flip classroom that used an intelligent tutoring system”, PHD. Diss., Ohio State University.
 - Talley, C., & Scherer, S. (2013). The enhanced flipped classroom: increasing academic performance with student-recorded lectures and practice testing in a 'flipped' stem course. Journal Of Negro Education, 82(3), 339-347.
 - Tucker, B. (2012) The Flipped Classroom. Education Next, 12 (1). Retrieved from <http://educationnext.org/the-flipped-classroomroom/>.
 - Tune, J. D., Sturek, M., & Basile, D. ,(2013). Flipped classroom model improves graduate student performance in cardiovascular, respiratory, and renal physiology. Advances in Physiology Education, 37, 316-320. doi: 10.1152/advan.00091.2013.

- Vaughan ,M. (2014) Flipping the Learning: An Investigation into the use of the Flipped Classroom Model in an Introductory Teaching Course . Educational research and perspectives .Vol. 41, 25-41.
- Wagner, D., Laforge, P., & Cripps, D. (2013). Lecture Material Retention: a First Trial Report on Flipped Classroom room Strategies in Electronic Systems Engineering at the University of Regina. Paper presented at the Canadian Engineering Education Association (CEEA13) Conference, Canada, June 17-20, 2013.