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Transformation from Millennial students to Engineers in Engineering Institutions- A case study

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Abstract: "It is not what you teach and how you teach
It is what your audience learns"

Recently the millennial learners occupy the classrooms. These learners are filled with their needs and characteristics. They need collaborative learning experiences, quick feedback and have low tolerance for boredom. The main challenge for the faculty is to keep the learners in the classroom fully engaged, challenged and focused. This paper discusses about the characteristics of millennial learners and the way of using technologies to reach the millennial learners in the classroom. The responsibility of the faculty is to create self-learners and life-long learners.

Keywords:

Millennial Learners, teamwork, technologies, flipped classrooms, learning strategies, Engineering Institutions'.

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1. Introduction

The famous definition for education is given by the John Dewey in the year 1916 itself as "Education is- a process of living and not a preparation for future living". Generation shift has taken place in many ways as the world is growing years after years, decades over. More number of Millennial is seemed to be swarming through the higher education institutions. Hence, teaching pedagogy has to be modified in such a way that these new set of learners has to be transformed so as to meet the demands. Therefore, (Camille DiLullo, 2015), suggested that next generation learners adopt various learning styles in order to gain information. Among the various types of learners, millennial learners grow and study with the help of internet. They use various recent technologies and get adapted to it.

From the work of (Elliot-Year and Sherri, 2012) it is understood that there exists various characteristics of Millennial learners and it has been given below:

Usage of technologies:

Learners use latest state- of- art technologies for learning purpose. There is no necessity for the learners to neither sit at class room nor at office for learning. Instead they could use even electronic devices for improving their knowledge.

Team work:

Learners would like to work in collaborative

manner by being social. Team spirit would be more in such a way that the traditional measurements have been used to define productivity.

Helping nature:

They would be ready to share the knowledge gained by them.

Comprehensive: These type of learners would not be satisfied with the content what they posses. They in turn search the Internet for searching so as to quench the thirst of knowledge. These learners have been trained to be open-minded of all races, religions and gender orientations.

Experienced users:

Learners are considered to be the best users of digital technology. As Information and Communication Technology becomes a part and parcel of everybody's life nowadays, searching for information and accessing becomes easier for learners. These learners perform many functions with mobile phones and other electronic gadgets rather than traditional computers.

Millennial users think differently. They are experienced users of technology.

2. Literature Review

(Elliot-Year and Sherri, 2012) discussed that the millennial learners are fond of their parents more than famous personalities in 33% of the cases. Millennial learners happened to grow up in a dangerous environment where they are prone to a dangerous environment but in a structured, sheltered protective environment. (Wilson and Gerber, 2008) identified that these type of learners like to interact much with their faculty and they expect more assistance. In addition, these learners try to grab much focus on them and like to have extra personal attention. Tolerance level for the millennial learners is found to be to a great extent since they live in a diversified world. The most important factor in a classroom activity is civility where students of all races join together in this activity where they learn to get along with others and getting most out of the education. According to (Allen and Christopher, 2013), it is found that a proper planning is required for the millennial learners and they did not expect to have as much freedom or responsibility for structuring their education lives. (Wilson and Gerber, 2008) identified that the millennial learners does the activities under the supervision. Hence, they have poor self-management and conflict resolution skills.

The groups which they have formed might lack the controlling hierarchy which in turn might lead to the confusion in point of contact for sharing the information. Simultaneously, this group is very eager in collecting new experiences. Students in this learners group are seemed to be very smart and responsive. Millennial learners are capable of organizing many tasks at the same time. This generation does multiple tasks like listening to music, working on the system and watching television. These types of learners need a strong motivation in the learning environment and they are very much focused on what they do. This group is socially cognizant. These young people show much interest towards politics and social issues. Millennial learners show much keen in knowing about the evaluation criteria of their performance. These learners also match their learning outcomes to economic objectives. They don't want to be under any stress and pressure. They record high value on increasing their interpersonal skills and getting along with their peers. Information sharing takes place in the form of digital media among this group.

3. Learning Strategies

A study done by (Kaiser, C.M. and Wisniewski, M.A. 2012) has paved a way for the improvement of learning strategies that have been adapted by millennial learners.To facilitate the knowledge acquisition for individual learners, programmatic content delivery must be designed in such a way that all the possible array of learning modalities could be utilized.

1. A leader to guide the team in order to accomplish the team work
2. Real time applications as assignment topics
3. Internships at various levels.
4. Real time applications as examples while handling classroom sessions
5. Regular updates about the topic to be delivered in the classroom.

6. Allowing the students in the classroom to interact with each other and bring the involvement in the classroom.

7. Identifying few personalities and make them to handle the class so as to develop self confidence.

8. Since the listening skill of a student is maximum of 15-20 minutes, there is a need to make the session a lively one.

9. Flipped classrooms.

Millennial learners are required to develop a host of skills which are significantly important in the professional world. Team work creates spark in millennial learner. Thus it leads to the contribution of gaining knowledge and strong communication skill. Millennial learners interact with each other and the feedback is given instantly and it is known from (Paul E.Kotz, 2016). Through this group work, learning is been enjoyed by the learners and hence as a result of this, their performance shows a great improvement. More group works, hands-on activities that is associated with technology friendly learning environment, it is understood that the performance gets boosted and their learning experiences has been benefitted.

One recent technology that could be adopted for millennial learners is the "flipped classrooms". Learners are asked to prepare on the topic which is to be given as a lecture on the following day. Therefore the basic fundamentals regarding the topic could be prepared by the students from the materials received by them. Due to this advancement learning of fundamental concepts, most of the time is devoted for the students to higher order learning activities such as practical real time applications and discussions towards the depth of the topic is done. Hence students get more opportunity in nurturing themselves in gaining knowledge. As a result of this, they will be eligible to do various projects. Various benefits of the flipped classroom model are

- Design of flipped classrooms meet out the educational needs of all generations of students
- Students' are able to choose their preferred learning style in such a way that time and speed is controlled
- Interaction time between student- student and student- teacher is optimized

It is understood that from (Phillips, Cynthia R, Trainor Joseph E 2014) that flipped classroom is considered to be as an efficient and effective educational pedagogy in which the students' learning capacity and knowledge could be improved. Students' interest towards learning the concepts has also been increased to a great extent. The outlook of a traditional and flipped classroom is shown in the below figure 1.

Differences between flipped classroom and traditional classroom is given in the below table I.

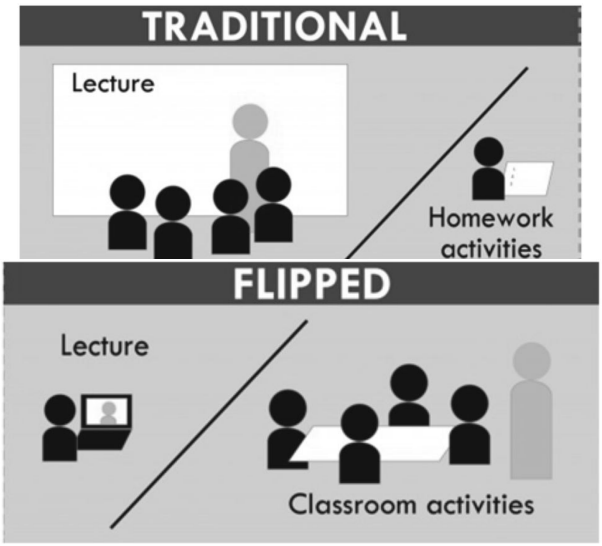


Fig 1. Traditional classroom Vs. Flipped classroom

Classroom activities could be any of these as mentioned below:

1. Playing quiz on particular topic:

Instead of the lecturer asking /preparing questions, a group could work on preparing it instantly and post to other group. The other group could answer and again in turn post the questions.

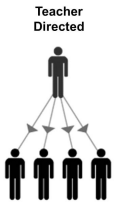
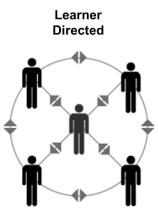
2. Just a minute:

The faculty might put forth a word so as to build many sentences in which information could be collected and shared.

3. Jumbled programs:

The lecturer might write the program in jumbled order and the students should bring/write the program in correct sequence.

Table I. Traditional classroom vs Flipped classroom

Traditional Classroom	Flipped Classroom
	
	
Long lecture hours	Small chunks of instructions
Sequential learning system	Parallel learning system
Usage of technology isvery limited	Many pedagogies and innovative approaches are used
Assessments are few and random	Frequent assessments are taken
Learning is done by listening	Learning is done by doing activities and participating in activities

4. Role play:

This is a very special activity where students could understand the concepts through clear demonstration. This showed a great impact while teaching a topic "Linked List" in "Data Structures" under Computer Science and Engineering Department. Usually students might feel difficult while learning the data structures concept. Under this concept, a student might assume a role to practice and demonstrate that role in front of all. This role play played a vital role in making the concepts clear to the students.

5. Mind map:

The lecturer should give a topic and the students could draw any picture they like and put the keywords inside the picture so that they could be able to bring out the whole concept in detail. For example, while teaching packages creation and implementation in Java, mind mapping could be done and it is shown below in figure 2.

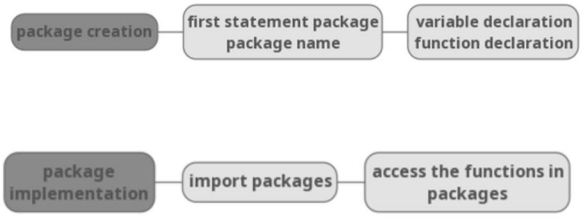


Fig 2. Mindmapping on topic package in Java

Package creation:

```
Package birds;
public class vertebrates implements birds
{
  public void fly ()
  {
     System.out.println( " birds fly");
  }
}
```

Package Implementation:

```
import birds.*;
Public class birdsdemo
{
  Public static void main(String a[])
  {
    Birds b = new birds();
    b. fly();
  }
}
```

6. Student-student interaction:

"For the students- By the students" concept has been implemented at our Institution and it is shown in the below figure 3. A Program "SCALE- STUDENT CONSORTIUM for ADVANCEMENT and LEARNING in ENGINEERING EDUCATION" has been conducted by the students for our students which have become a platform for the students to develop

their interpersonal skills and nurture their career. The main objectives of the workshop are

- It becomes a global platform for the students to share their ideas
- Students get an opportunity to present their ideas globally
- Creativity could be still refined and tuned so as to compete nationwide

For the students- by the students- student-student interaction

Fig 3. Scale project (Student-Student interaction)

Creativity has been exhibited in various ways and it has been shown in the below figure 4.

7. Enhance teaching using technology:

Various technologies like PowerPoint presentations, content management systems, Online learning systems and podcasting etc could be used to reach the millennial learners classroom. Among these, recently podcasting grabs the attention of millennial learners since it plays the vital role in educational purpose. The main objective of podcasting is to review or examine the lecture content, issuing study review notes, broadcasting full lectures in case of students unable to attend the class. Podcasting is relatively easy to master and most college IT departments can provide support and equipment needed to create these brief downloadable audio recordings. An attempt has been made to observe from the students to know about the type of knowledge they gain through various methods have been listed in the table 2 as given below.

Figure 4. Creative works done by our students at scale program

Table II. Knowledge Gain in activities

Components	Domain Knowledge	Conceptual knowledge	Authoritative knowledge	Empirical knowledge
1.Classroom activities				
a. PPT				
b. playing quiz	-	✔	✔	-
c. Issuing e-content to students	✔	✔	✔	-
d. any form of media(videos, animations, etc	✔	✔	✔	✔
e. student-student interaction	-	-	-	-
f. Roleplay	-	✔	✔	✔
g. traditional chalk and talk	✔	✔	✔	-
2. Projects	✔	✔	✔	✔
3. Group Activities	✔	✔	✔	✔

4. Conclusion

Definite solutions as discussed above in this paper could be recommended for using technology to teach the millennial students. Collaborative learning could be incorporated in the curricula in which ICT could be integrated and used for teaching purpose. Curricula could be designed in such a way to make students to inculcate certain techniques and tools to nurture students' interpersonal skills. As per the discussion done in the above sections, faculty could adopt any of those solutions to reach the millennial students and make them to transform into successful engineers.

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