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# USING BLENDED LEARNING IN OUR TEACHING OF L.C. CHEMISTRY

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**“YOU LEAD WITH TEACHING,  
NOT TECHNOLOGY.”**

**Dr Mark Glynn**

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# OVERVIEW

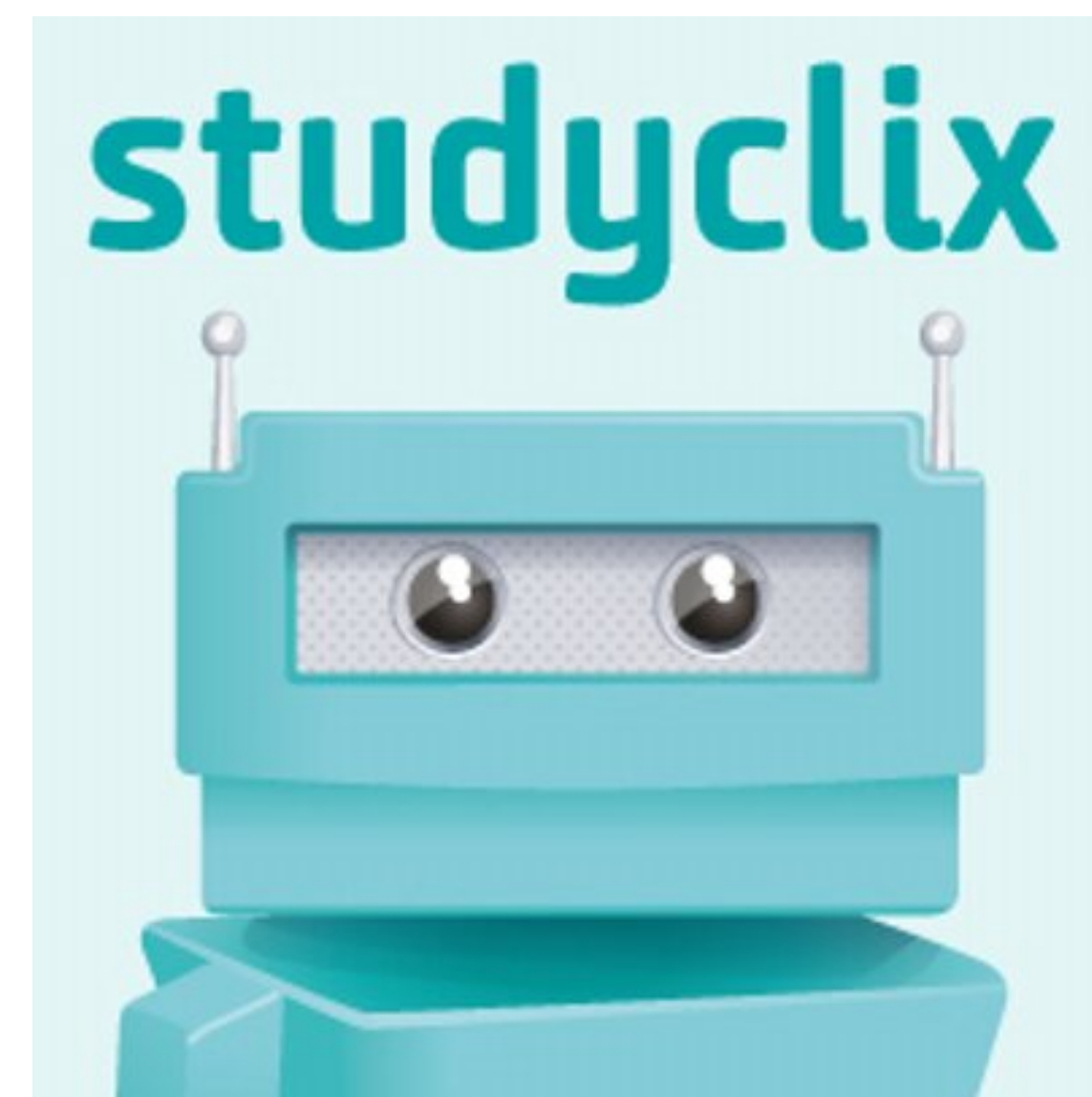
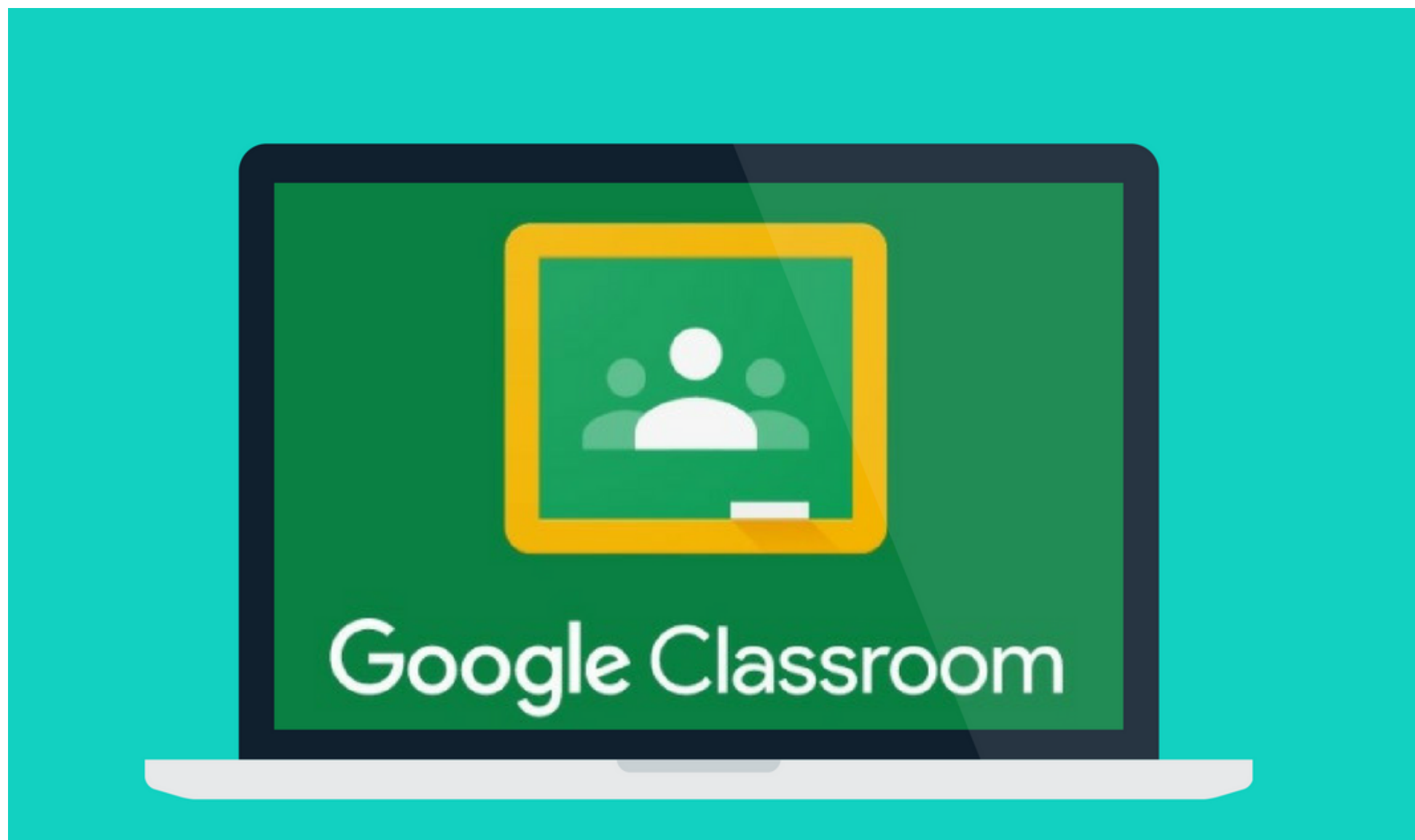
- **Introduction to online learning educational terms**
  - **Blended learning**
    - **The flipped classroom**
  - **My research overview**
  - **Research results**
  - **Recommendations**
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**“A FORM OF EDUCATION WHICH IS  
DELIVERED AND ADMINISTERED  
USING THE INTERNET.”**

**Online Learning**

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# THE RISE OF ONLINE LEARNING

- **Online learning in education began in the University of Illinois in the late 1960s.**
- **By the 1990s technology had improved dramatically which only increased the use of online learning in universities.**
- **Improved technology and reduced costs are two key driving forces for online learning at university level.**
- **By 2019, students at 3<sup>rd</sup> level taking online courses jumped by 200% in Ireland.**





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**“SECONDARY SCHOOL STUDENTS  
CANNOT AND SHOULD NOT BE  
TREATED THE SAME AS  
UNDERGRADUATE STUDENTS.”**

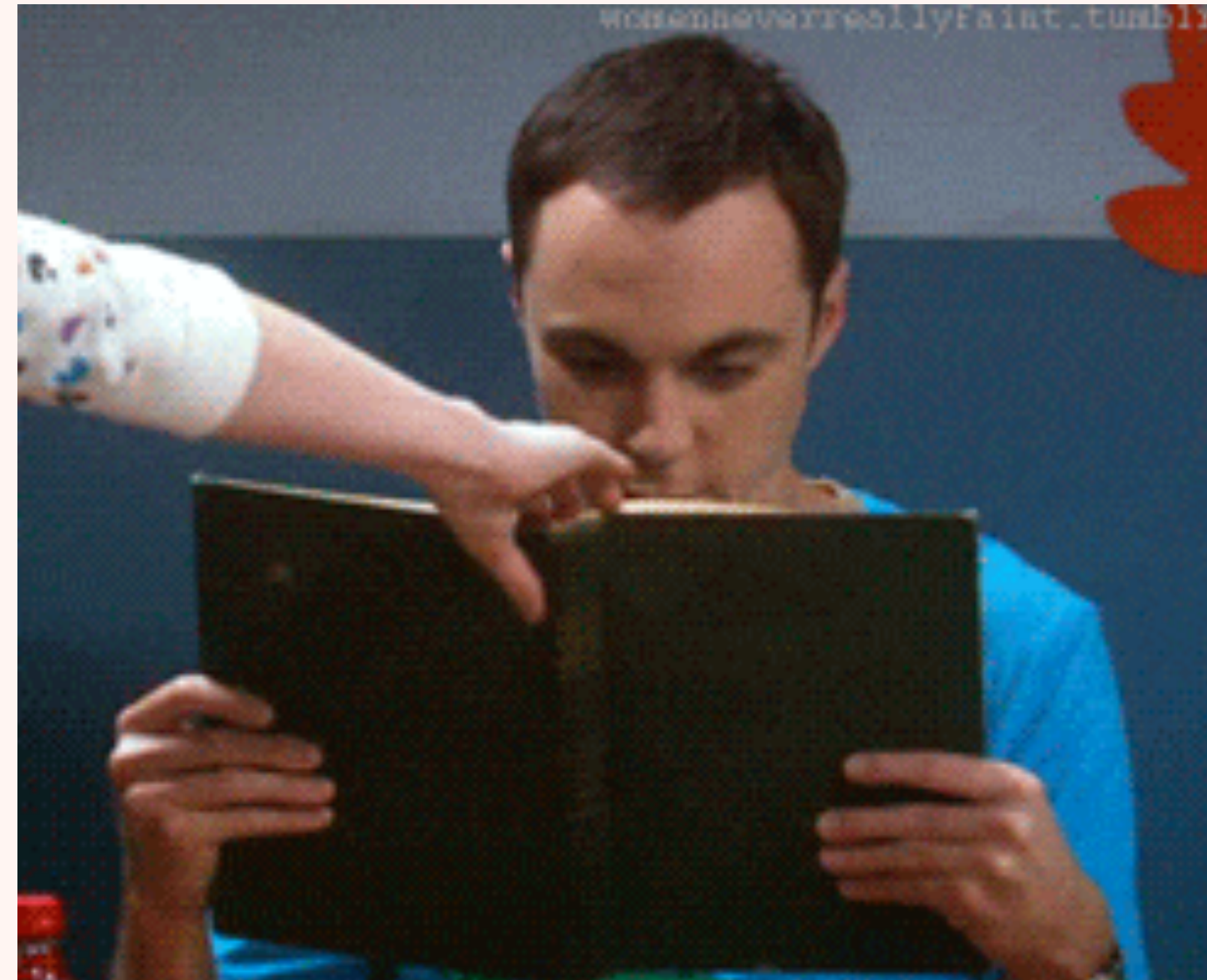
**Ryan Gallagher and probably a lot of other people too**

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## PROBLEMS WITH ONLY ONLINE LEARNING

- **Difficult for students to ask questions.**
- **Lecture format easiest to do - passive learning.**
- **Internet service/equipment might be a barrier, particularly for disadvantaged students.**
- **Quality of lesson might be poor.**



**High level of discipline  
required by teenagers**

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# **BLENDED LEARNING**

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**“A METHOD OF TEACHING THAT  
INTEGRATES TECHNOLOGY WITH  
TRADITIONAL TEACHER-LED  
CLASSROOM ACTIVITIES, GIVING  
STUDENTS MORE FLEXIBILITY TO  
CUSTOMISE THEIR LEARNING  
EXPERIENCES.”**

**Blended Learning**

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# SCENARIO 1

➤ **The teacher teaches the content in class, the student then completes an online quiz or watches a video or researches a topic at home using the internet.**

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## SCENARIO 2

- **The teacher assigns homework not previously taught in class.**
  - **The student is then assessed on the homework in school.**
  - **A.k.a. *'The Flipped Classroom'***
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# **BLENDED LEARNING RESEARCH (INTERNATIONAL)**

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# **BENEFITS OF BLENDED LEARNING**

- **Teachers can be more engaging and can provide better support within the classroom.**
  - **Teachers are empowered and do not feel under as much time pressure to cover content.**
  - **Students can learn at their own pace while still keeping up with the class.**
  - **Students are more independent learners.**
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# DISADVANTAGES OF BLENDED LEARNING

- **Success criteria not always clear.**
  - **Quality of the online material may be poor.**
  - **Internet service may be a barrier.**
  - **The use of technology might be challenging.**
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# THE FLIPPED CLASSROOM

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**“STUDENTS REVIEW A TOPIC BEFORE CLASS AS HOMEWORK. IN-CLASS TIME IS THEN DEDICATED TO DISCUSSIONS, INTERACTIVE EXERCISES AND INDEPENDENT WORK THAT WOULD HAVE PREVIOUSLY BEEN COMPLETED AT HOME — ALL UNDER THE GUIDANCE OF THE TEACHER.”**

**The Flipped Classroom**

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# RESEARCH TO DATE - BARRIERS

- **Mostly 3<sup>rd</sup> level research available or it is exclusively 'online learning only'**
  - **Mixed results.**
  - **Workload is high - initially.**
  - **Most but not all students have equipment necessary to do flipped classroom model.**
  - **Everything hinges on the quality of the video lesson (or online material) and the success criteria.**
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# RESEARCH TO DATE - BENEFITS

- **Simple to implement to suit preferred teaching style.**
  - **Allows for 'student centred learning' and 'active learning'**
  - **Results generally improve (varies).**
  - **Student independence increases.**
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## **THE FLIPPED CLASSROOM - DOUBLE-EDGED SWORD**

- **The pros and cons of the flipped classroom are largely the same as blended learning except they have higher stakes.**
    - **Students' independent learning can be greatly improved upon as well as their results.**
    - **However students could learn less due to inappropriate success criteria or poor online material.**
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# MY RESEARCH



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# RESEARCH QUESTIONS

- **Can the use of online technology be used to teach Leaving Certificate Chemistry? If so, what level of success can be achieved from its use?**
    - **Will results improve?**
    - **Can the flipped classroom be used successfully by teachers?**
    - **Does the use of blended learning allow for more 'time' in the classroom?**
    - **Can the classroom become more interactive?**
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# MY RESEARCH IN A NUTSHELL

- **A minimum of 10 science teachers and 100 students took part in the study.**
  - **A website was created and educational videos for every chapter in chemistry were made.**
  - **A 2 year 'action research' mixed method study was then carried out.**
  - **In year 2 of the study improvements were made and implemented.**
  - **The quantitative and qualitative results were then analysed.**
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# The Conical Flask

**R. Gallagher**



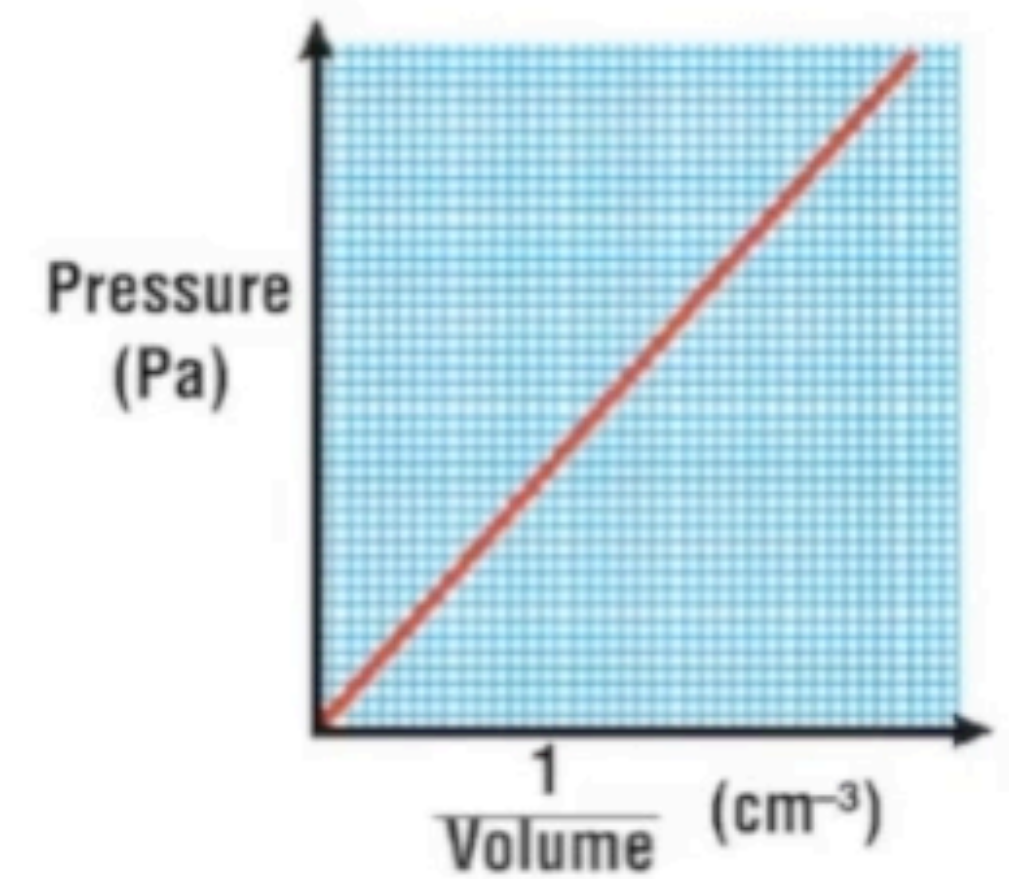
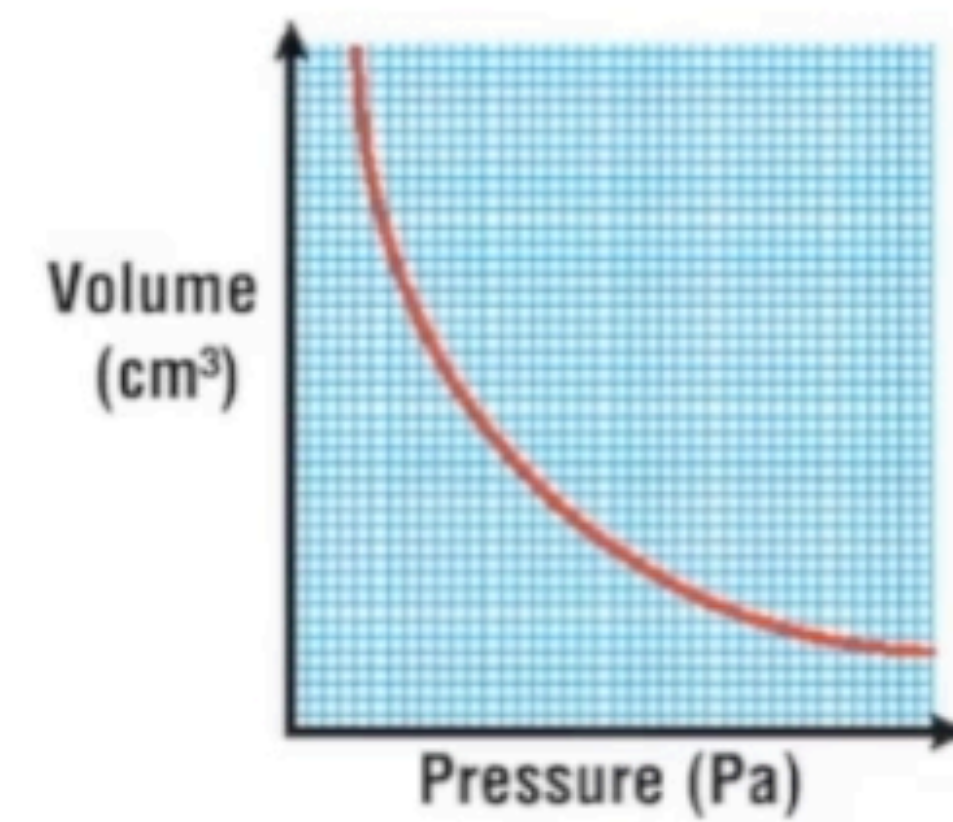
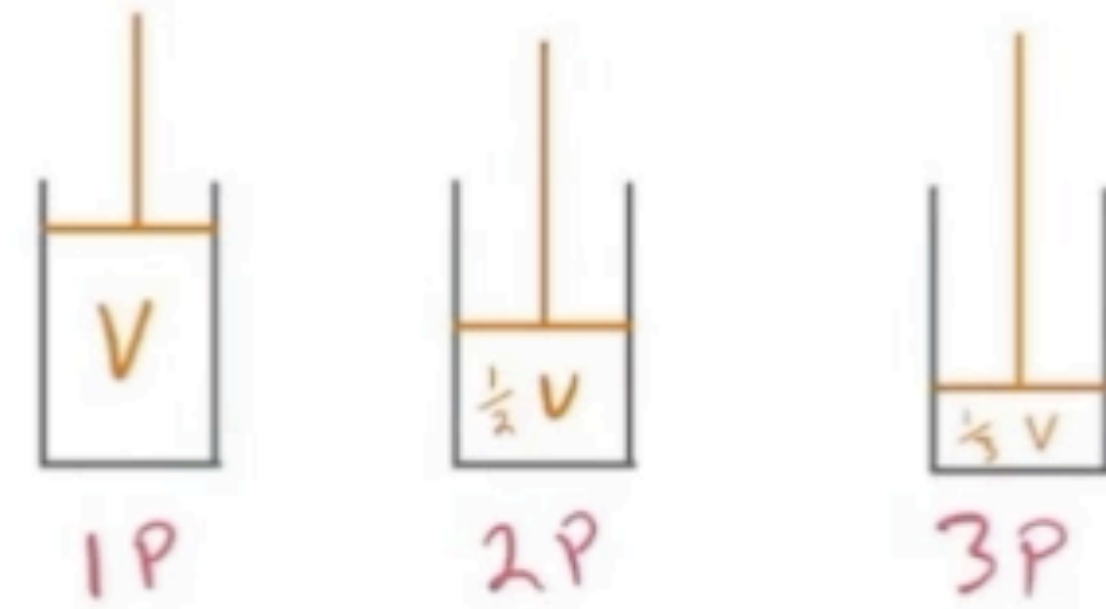
# VIDEO LESSON

## Boyle's Law



Robert Boyle

Experimented with pressure + volume



$$V \propto \frac{1}{P}$$

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# THE RESULTS (YEAR 1)

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**“THE FIRST YEAR WAS A  
LEARNING EXPERIENCE...”**

**Ryan Gallagher 🥲**

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# THE 5 KEY ISSUES

- 1. Audio was too low.**
  - 2. Playback issues.**
  - 3. Not enough content.**
  - 4. Teachers weren't sure of how to use 'the flipped classroom' approach effectively.**
  - 5. Several shorter videos better than longer ones.**
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# THE FLIPPED CLASSROOM RESULTS

- **Only a partial success - teachers were unsure of how to implement the model.**
  - **Students preferred live in-person classes to video lessons, but also liked interactive class time more than in-person lessons**
  - **Success criteria is critical.**
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# YEAR 1 SUCCESSES

- 1. Numbers were very high - 6,000 students in total used the website.**
    - The inclusion of the notes doubled the numbers.**
  - 2. The quality of the video lessons were rated favourably.**
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# SOLUTIONS GOING INTO YEAR 2

- **Bought a microphone - re-recorded every video lesson 🤯**
  - **More content added to every chapter - quizzes, interactive slides etc.**
  - **Moved videos to YouTube.**
  - **Wrote two articles on 'blended learning' and 'the flipped classroom'.**
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# WEBSITE LAYOUT

- 1. Video lessons**
  - 2. Presentation**
  - 3. Notes**
  - 4. Model questions & solutions**
  - 5. Google quiz**
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# INTERACTIVE PRESENTATIONS

The Maths of Chemistry

Experiments (Theory)

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# THE RESULTS (YEAR 2)

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**62,000**

**The number of users**

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# STUDENT RESULTS

- **Rated the video lessons favourably.**
  - **The added sections were consistently rated highly.**
  - **Students were capable of studying chemistry by themselves.**
  - **Students regularly stated they felt “more confident” after watching a video lesson and using the notes.**
  - **Many students stated they didn’t feel they needed grinds from using the website.**
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# TEACHER RESULTS

- **Blended learning or the flipped classroom approach not as difficult as expected.**
  - **Teachers noticed an increased level of understanding from students.**
  - **Students' results possibly improved but difficult to gauge with school closures.**
  - **Content was covered far more quickly allowing for more time in the classroom for assessment - reducing teacher workload.**
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# THE FLIPPED CLASSROOM RESULTS

- **Very successful - teachers were far more confident this year.**
  - **Classes became more engaging.**
  - **Students were capable of learning for themselves.**
  - **Students found the flipped classroom to be very “meaningful” learning.**
  - **More successful for senior classes than junior cycle.**
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# QUESTIONS UNANSWERED

- **How much can grades improve by realistically using blended learning?**
  - **Can the same successes occur for other subjects?**
  - **How successful can blended learning be for Junior Cycle students?**
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# RECOMMENDATIONS

- **Video lessons could start off as subject department-based initially to reduce the workload and increase creativity and productivity.**
  - **Video lessons by themselves are not enough. Notes and some form of assessment are necessary.**
  - **Ensure that you have proper equipment to record and edit.**
  - **Success criteria and quality of material/online lessons is critical.**
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# THE CONICAL FLASK - WHAT'S NEXT

- **Dedicated experiment “exam questions ” section for LC biology & chemistry.**
  - **Quizzes are coming back! - this time forcing users to make a copy without editing.**
  - **More ‘Bitesize’ LC chemistry videos, including videos for JC chemistry.**
  - **A dedicated Transition Year chemistry section with resources to ‘bridge the gap’**
  - **JC is getting a complete revamp.**
  - **Additional teaching resources.**
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**THANKS FOR LISTENING!**

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