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Introducing Critical Thinking: How to Intercept a First-year Undergraduate's Way of Thinking

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Introduction

The provision of support to first year students is now standard practice at third-level. This is driven very much by the need to improve retention and the necessity to support a more diverse cohort of students that attend third level since access has been widened nationally (Higher Education Authority, 2015). Much of the focus of this support is aimed at the first half of semester one with inductions and information sessions outlining the facilities and services within the organisation that students can avail of to ease their transition into undergraduate life (University of Limerick, 2010).

There are sessions dedicated to educating first year undergraduate students on how to use new facilities and technologies which are available to them once entering third level education such as the virtual learning environment (VLE), the library and its databases, how to write a laboratory report/portfolio/blog entry and the use of software tools that enable assignments to be submitted online. The base for this work is typically a Critical Skills type module and, in tandem, the students then should apply and develop the skills from this module to all the other modules they are taking throughout the year.

A key skill that is taught to some degree in Critical Skills is how to think critically about a problem or task in order to achieve a deep understanding of what's involved. However, because this is a more difficult skill that must be developed alongside the practical element it often gets lost in the process and left behind, mainly because it cannot be thought by traditional methods (Adair & Jaeger, 2016). Some lecturers do not expect first year students to be able to think critically and do not push the student towards achieving deeper thinking in their module. With so much focus on retention (Larmar & Lodge, 2014) it is understandable that a lecturer will concentrate on ensuring that students focus on learning fundamentals.

However, research does show that many lecturers consider critical thinking to be the number one goal of undergraduate education (Haynes, Lisic, Goltz, Stein, & Harris, 2016; Re, Amenduni, De Medio, & Valente, 2019), and that it is only the difficulty in assessing critical thinking (Adair & Jaeger 2016) and the availability of training for the teaching of critical thinking (Larmar & Lodge, 2014; Re, Amenduni, De Medio, & Valente, 2019) that is holding back its implementation across programmes. As assessment drives learning, critical thinking practices must be integrated into the assessment process.

Objectives

In this report strategies are proposed to develop first year undergraduate students' awareness of critical thinking and ability to think critically. This will be achieved by introducing critical thinking to the students from the commencement of first year using a thematic approach and a focus on the use of assessments to drive critical thinking. It is proposed lecturers introduce assessments to incorporate critical thinking.

A suite of visual infographics is developed for the lecturers of first year students that illustrate modes of thinking as a path to effective learning, which will facilitate undergraduate first year students transitioning from dualistic thinking to autonomous critical thinkers.

Literature Review

First Year Students Transition into Higher Education – The First Year Experience Social & Academic

Research has shown that entering into higher education can prove a difficult time for first year students. The first semester can be a time where students may decide to leave college and it is imperative that higher education institutions have the supports in place to nurture and guide students on their arrival. It is a formative period as students adapt to the unaccustomed surroundings and unfamiliar methods of academic studies and learning. This transition is influenced by many factors, including academic and social involvement, family background, peer group, socioeconomic status and academic preparation (Pascarella, Pierson, Wolniak, & Terenzini, 2004). During this time the ability to adapt and make positive progress is essential for the wellbeing of each student along with gaining the tools to complete college to a high standard which in turn will provide graduate attributes which are required in the workforce and graduates who will give back to society (Haynes, Lisic, Goltz, Stein, & Harris, 2016; Vijayaratnum, 2012).

Orientations for first year students allow them to engage and familiarise themselves with their new surroundings. These are now being developed further with specific programs to assist with retention. University of Limerick implemented the "First Seven Weeks Plan" (University of Limerick, 2010), Trinity College have "Trinity in 12 weeks" bringing students through their first semester and University College Dublin provide first year students with peer mentors from the students' programme or subject area. During these programmes third level learning is introduced. We would like to see critical thinking coming to the fore at this time.

Critical Thinking Explained: Thinking – Low level, High level, Critical and others.

A good starting point in the discussion of thinking is to use Blooms taxonomy as a reference. Bloom (1956) recognised the cognitive processes of knowledge, comprehension, application, analysis, synthesis, and evaluation. This then gave rise to the concept of high-level thinking (application, synthesis, evaluation) and low-level thinking (knowledge, comprehension, application). It is generally agreed that students enter higher education with low-order thinking skills (Chen, 2017; De Jager, 2012) but need to attain the high-order thinking skills to be work-ready graduates.

Low-order thinking is used for rote learning, that is recalling facts and explaining things. Higher-order thinking skills brings a student into the active learning area where they can solve problems, consider opinions, make judgements, and form new ideas (Brookfield, 2012). Another term used for this level of thinking is critical thinking, where "critical" can be thought in general as making a judgement. A more concise definition is given by Chatfield (2018, p6) who describes critical thinking as "actively setting out to understand what is really going on, by carefully evaluating information, ideas and arguments - and thinking carefully about the process of thinking itself".

The ability for critical thinking is a high priority for those setting education standards and the many professional bodies for a variety of disciplines (Adair & Jaeger, 2016; Larmar & Lodge, 2014; Re, Amenduni, De Medio, & Valente, 2019). As Thomas (2011, p26) points out, "critical thinking is seen as the trademark of a well-educated person and as important for becoming an active and engaged employee and global citizen".

Thomas (2011) also alludes to the fact that many academics feel critical thinking should be developed from the first year of university as it is a skill that is prerequisite for enabling students to complete a university programme. While developing critical thinking skills is widely viewed as important, it is necessary to avoid compromising the development of the core competencies required for each programme. This has been highlighted as an issue by Daymon and Durkin (2013) who discuss how the development of new universities has created tension between industry and academic institutions, where both are divided on what the main focus should be, the demands of industry or of the university. For some disciplines effectiveness in the workplace following graduation is key for employers whereas educators are striving towards a deeper understanding of the discipline (Strauss & Mooney, 2016).

Introduction to Critical Thinking.

It is necessary for the academic staff to be conscious of the student in front of them and be mindful of their diverse background and capabilities (Vickless, 2019). The challenge of educators is to expose and develop a student's awareness of critical thinking within their academic field.

Ritchey (2019) questions whether the correct tools are being given to students to allow them to achieve the goals academics have set for them throughout the lifespan of their course. From an early stage incorporating critical thinking into lectures would provide additional emphasis and allow time to develop these skills alongside the core competencies. Mac Pherson (2015, p2) states "in order to think you have to have something to think about".

This requires from the onset curiosity being nurtured, questioning encouraged and skills developed to describe and justify their own work (Nilson, 2014). Modules that develop critical thinking from an early stage empower students with the tools to achieve a greater understanding of their work, allowing for the link between academia and the workforce and encouraging students to engage and participate actively in their own learning

Integration of Assessment and Thinking

It is widely accepted that assessment is the key driver for learning and as good learning must involve deep thinking the focus on the thinking should be incorporated into assessments to drive the learner to participate in critical thinking (Adair & Jaeger, 2016; (Haynes, Lisic, Goltz, Stein, & Harris, 2016; Re, Amenduni, De Medio, & Valente, 2019). With the emphasis coming away from the more traditional formative assessment methods the opportunities are vast for accessing the student's ability to critically think.

Traditionally the design of assessments has been prescriptive and process oriented, leading to the students following a set path to produce results and evaluate data. This process removes the thinking from the activity and therefore impedes the development of critical thinking from an early stage.

Criticism can make people uncomfortable, but critical thinking is about going beyond the obvious: what do you actually know? De Bono (1985) has made some very helpful leaps on the subject of critical thinking that can be applied in all areas of education. Six Thinking Hats (1985) provides a toolkit for addressing any particular problem that you may encounter in life. For an illustration of the key aspects of the De Bono modes of thinking see appendix 1. Advancement in human understanding of cognitive load theory in the work of Kahneman (2011, pg. 30) tells us that we must be mindful of how information is transmitted to the student in order to avoid cognitive overloading, 'anything that occupies your working memory reduces your ability to think,' opening up the capacity within one's memory for critical and lateral thinking

To implement the use of critical thinking within assessments requires a redesign of the assessment, incorporating a shared definition of what critical thinking means to the assessor. There is no absolute definition but there is a commonality in many with Brookfield's view that critical thinking involves finding assumptions, checking the assumptions, taking different viewpoints, and taking informed action (2012). This can be seen as a broad definition for embedding into assessment. Chatfield's (2018, p6) definition of "setting out actively to understand what is really going on by using reasoning, evaluating evidence and thinking carefully about the process of thinking itself" would seem a more definitive explanation for students as it is easier to understand in terms of application to producing submissions for assessment. As highlighted by Ritchey (2019) earlier it is a necessity to give the students the required information to reach their potential.

The design of assessment should include methods of critical thinking where the onus is on the student to apply themselves through their own thinking. During the assessment the student is then solving a number of problems to complete the task requiring critical thinking. One such process devised by Polya (1957) helps the student to identify and critically think about the problem.

These are identified in the following steps and flowchart:

- Write out (layout) the problem.
- Do I understand the problem? Yes/No.
- Have I solved a similar problem before? Yes/No.
- Compare the problem with how I solved the previous problem.
- Work on the solution to the current problem.
- Solution – is it right? How do I know?

Using Polyla's steps we have identified a strategy and suggest a simplified flow chart as illustrated below which can be used by students to solve a problem through critical thinking.
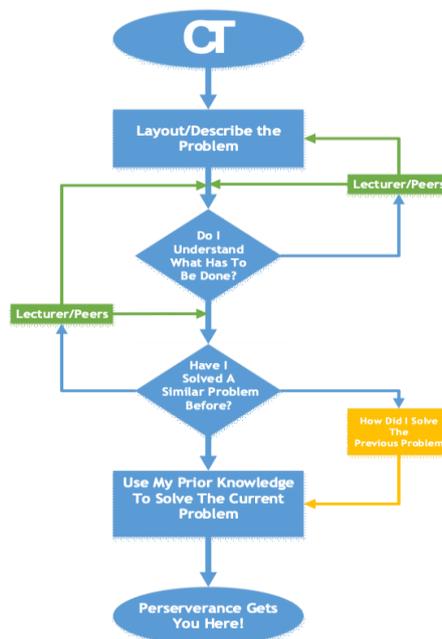

Figure 1: Illustration A: Critical Thinking Flow Chart.

Seven Steps Towards Critical Thinking

Over the course of our research the following Seven Steps Towards Critical Thinking have been established drawing on Chatfield (2018) and Brookfield (2012). These seven steps integrate the stages of critical thinking throughout the students learning process. It explains each step bringing the undergraduate first year from low level thinking to critical thinking using the developed steps. One may approach any problem in higher education deploying these seven steps but also filtering each stage through the lens of critical thinking: 'What? Why? and How?

These seven steps are illustrated in the poster see appendix 2.

Seven Steps Explained

1. Pay Attention: Slow down and don't take the problem simply at face value
2. Notice: Consider the motives behind the issue at hand
3. Engage: Research around and within the topic
4. Grasp it: Ask questions of the problem, what is the nub of the issue?
5. Map it: Don't assume that you are correct or that the answer has even presented itself yet! Map out the terrain and look for patterns in an open-minded manner.
6. Describe it: Break the issue down into its constituent parts.

7. Innovate around it: Keep it simple, look laterally at the problem to begin to unlock the 'knowledge' around and within your chosen subject.

Conclusion

Throughout the research it has been noted that students require support to succeed in third level education (Higher Education Authority, 2015; Larmar & Lodge, 2014). As these skills require year on year support for TU Dublin's diverse range of students entering first year, this formative transition should be assembled into a smoother experience with scaffolded support for those requiring further assistance. By engaging the student body from the outset in critical thinking methods it will change the mind-set of the school leaving learner to emerge as a critical thinking lifelong learner.

A student should not expect to immediately possess these skills, but providing students with a route to this knowledge and affording them the time to develop critical thinking strategies will encourage deeper learning, deeper understanding of their discipline setting out on a pathway to a wider range of graduate attributes leading to self-motivated critical thinkers, as De Bono (1985) said 'Thinking is not an excuse for inaction but a way to get better action".
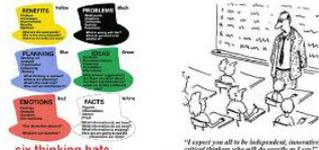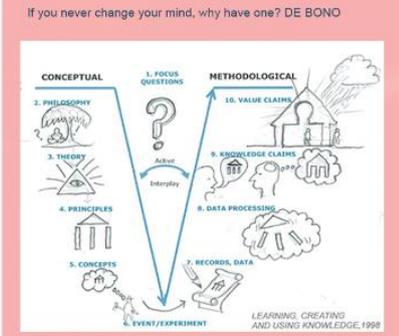
Recommendations

· Introduce all first year undergraduate students to critical thinking via workshops in semester one.
· Develop critical thinking throughout all first year modules.
· Provide training to academic staff on critical thinking; through Brightspace disseminate the Seven Steps Towards Critical Thinking poster (appendix 3).
· Incorporate critical thinking into assessments.
· Provide students with the information and tools to think critically; academic and practical information through problem solving diagrams developed.

Figure 2: Introduction to Critical Thinking Poster

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