# Developing First Year Students' Critical Thinking Skills

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**Abstract**

Critical thinking is a crucial skill that students need to develop while at university. It is important for a well-educated person to be able to make well-informed judgements, be able to explain their reasoning and be able to solve unknown problems. This paper proposes that critical thinking can and should be developed from the first year of university in order for students to cope with their future studies and to be of most use to future employers. The paper describes five exercises that can be used to develop critical thinking in first year students.

**Keywords:** Critical thinking, First year pedagogy, Generic skills, Graduate attributes

## 1. Introduction

"*It is the mark of an educated mind to be able to entertain a thought without accepting it.*" – Aristotle

Universities need to develop graduates who are able to make well-informed judgements and who are capable of making connections between their learning and practice. Graduates of the future will need to deal with the unknown and solve problems that may not even exist currently (Boud & Falchikov, 2006). Critical thinking is crucial to achieving this outcome and is seen by some as the trademark of a well-educated person and as important for becoming an active and engaged employee and global citizen (Facione, 2010; Fagin *et al*., 2006; Moore, 2004).

In Australia all universities are required to state what graduate attributes they develop in their students. Usually these attributes will include critical thinking or higher order thinking. Despite this, some people believe that university students should have developed their ability to think critically prior to attending university and that they either have the ability to think critically or they do not (Kurfiss, 1988). Others feel that students will pick up the skills as they apply them, as articulated by a lecturer who was interviewed by Jones (2007, p. 97): "I don't know if I teach it explicitly; you sort of imagine they would pick it up along the way perhaps." Paul, Elder and Bartell (1997) report on a study in California that found that although 89% of academics thought critical thinking was the primary objective of their subject, only 19% could explain what critical thinking was and only 9% were teaching critical thinking skills.

The Scottish Quality Enhancement Theme on first year experience was built around two concepts: raising students' engagement with their learning; and empowering first year students with the competencies that they need to learn effectively (Mayes, 2009). They argue that empowerment of students offers support for all students to achieve to their full potential.

This paper proposes that critical thinking skills can and should be developed in first year students, thus giving them the tools that they will need through the rest of their studies and for employment afterwards. The paper centres on three questions:

- Why learn to think critically in the first year of university?
- What skills do we need to develop in our students to be critical thinkers?
- How can we develop critical thinking skills in first year university students?

The paper provides four concrete examples that illustrate how critical thinking skills can be developed in the first year. These activities were developed by a project funded by the Australian Learning and Teaching Council to investigate the embedding of generic skills in a business curriculum (Vu, Rigby, & Mather, 2011).

**2. Why learn to think critically in the first year of university?**

It is important to develop students' graduate attributes across the curriculum and across the three years of a degree. Hughes and Barry (2010) suggest that assessing these attributes is critical in ensuring that students understand their importance. Students need to grasp that it is essential for them to develop a critical approach in order to be skilled employees who are able to adapt to new situations in the workplace (Forrester, 2008). It is especially important that students develop their meta-cognitive skills in their application of critical thinking in order to be successful at university (Jones & Ratcliff, 1993; Johnson, Archibald, & Tenenbaum, 2010). By starting in first year, we offer the students more opportunities to practice the skills they need to be critical thinkers so that they can embed them in their learning in later years.

There is some debate as to whether skills like critical thinking should be taught independently or whether they should be integrated into the discipline area. Hughes and Barrie (2010) suggest that there are four distinct orientations for the teaching of graduate attributes, namely precursory, complementary, translation and enabling. They propose that if you see critical thinking as "complementary" then it would be taught separately from the discipline knowledge and assessed using decontextualised standardised tests. If, however, critical thinking is seen from a "translation conception" then it needs to be applied to disciplinary knowledge and assessment therefore should embed the learning of the attribute and the assessment of that attribute. McPeck (1981) argues that the transfer of critical thinking skills is more likely to occur if applied to the power of discipline knowledge, and Jones (2007) supports its development within the curriculum as she maintains that different discipline areas require different ways in which critical thinking is applied and understood. This paper focuses on critical thinking skills from a "translation" conception and proposes ways of developing and assessing critical thinking within the curriculum.

Critical thinking is conceptualised and understood in different ways depending on the discipline according to Jones (2007). She compared the critical thinking skills applied and assessed in History to those applied in Economics. The two disciplines used totally different critical thinking skills. She found that Economics lecturers, for example, base the teaching of critical thinking around the application of economic models and how they work; they focus on problem solving and evaluation of policies. Some lecturers at the postgraduate level helped their students understand that models do not always explain a situation and presented examples of where the models did not work, or where there were cultural, developmental or environmental factors that provided alternative explanations. At the undergraduate level the focus was on logic and analysis, evaluation of policy propositions and application of theory.

When embedding the development of critical thinking and meta-cognitive skills within the learning of the discipline, it is crucial for students to receive effective, deliberate practice in the skills and to be provided with appropriate feedback (Johnson, Archibald, & Tenenbaum, 2010). Nicols (2009) agrees that early formative assessment and feedback are important in order for first year students to obtain a clear understanding of what is required for tertiary study. He says that first year students need to learn how to assimilate into the culture of the university while also being given the skills to take control of their own learning. Academics need to create assessments and activities that develop students' ability to work at all the levels of Bloom's taxonomy, including their ability to analyse, evaluate and create (Black & Ellis, 2010).

The feedback given on an assessment or activity that helps to develop critical thinking needs to include feedback on the students' critical thinking skills. Wingate (2010) proposes that there is often a gap between the feedback that academics think they are providing and the students' understanding of that feedback. She maintains that making comments like "more critical/analytical approach is needed" or "too descriptive" do not help students to improve their writing. Students need to be given more direct guidance as to what they need to do in order to improve their application of the higher order thinking skills.

By the time the student leaves the university, we want them to be able to be autonomous and to be able to apply "principled, reflective judgement" (Facione, 2010). First year lecturers should scaffold students' learning of critical thinking by making the critical thinking skills explicit, asking students to think about their learning from different perspectives, and presenting them with structured opportunities for developing the critical thinking skills. Providing these opportunities in first year will enable students to learn how to learn, how to think for themselves, and how to reason with others by the time they graduate (Thomas, Davis, & Kazlauskas, 2007).

Critical thinking is valued as an important skill by employers and is one that they look for in applicants for a job (Hager, 2002).

**3. What are the skills of critical thinkers?**

Facione (2010) reports on a statement created by consensus between a group of experts in critical thinking who suggest: "The ideal critical thinker is habitually inquisitive, well-informed, trustful of reason, open-minded, flexible, fair minded in evaluation, honest in facing personal biases, prudent in making judgments, willing to reconsider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in the selection of criteria, focused in inquiry, and persistent in seeking results which are as precise as the subject and the circumstances of inquiry permit." (p. 22)

Bloom's taxonomy (1956) of levels of thinking has been revised by Anderson and Krathwohl (2001). The revised taxonomy still has six levels but has made "create" the highest level and they have renamed and combined other levels to give the following: (i) Knowledge – Remember; (ii) Understand – Describe, Explain; (iii) Apply; (iv) Analyse; (v) Evaluate; and (vi) Create. Students should be required to learn to work at all of these levels of thinking (Black & Ellis, 2010). Critical thinkers would be able to work at the higher levels of Bloom's revised taxonomy. Creative thinking and critical thinking can be viewed as complementary, with both skills being student-centred and encouraging students to think independently (Forrester, 2008).

As can be seen from Falcione's definition and Bloom's taxonomy, critical thinking has many dimensions. The ability to know what skill to use in a particular situation and to be able to apply that skill without bias and taking others' views into consideration is not easy to learn and is even more difficult to teach. There are, however, a number of critical thinking skills that we can teach out students in order to develop these higher order thinking skills and empower them to be critical thinkers. A selection of those skills is presented in the following list (Facione, 2010; Forrester, 2008):

- Consideration and evaluation of different points of view;
- Open-mindedness;
- Development of a logical argument with appropriate evidence;
- Identifying the flaws, weaknesses or strengths of an argument;
- Identifying bias in themselves and others;
- Establishing priorities or decoding significance;
- Analysis of the quality of sources;
- Synthesise from a variety of sources;
- Deduction – reasoning from the general to the specific;
- Induction – reasoning from the specific to the general;
- Problem solving, even with previously unknown problems;
- Development of criteria for evaluation;
- Evaluation of their own decision making;
- Evaluation of their own work and that of others;
- Purposeful, reflective judgement; and
- Self-regulation.

Another important aspect of critical thinking is meta-cognition: being aware of how we think. By making students aware of their own thinking and how they apply different thinking skills; they are better able to control and improve their thinking (Jones & Ratcliff, 1993, p. 10).

In Australia, higher educational institutions are being encouraged to take in more students who are often less prepared for higher education. Development of generic skills like critical thinking can help all students cope with university and help to reduce failure rates without lowering standards (Young & Aoun, 2008). It is not proposed in this paper that critical thinking is as easy as learning a number of skills and being able to apply them. The paper proposes, rather, that learning these skills in first year will help students to be aware of their need for critical thinking skills and that will enable them to integrate the skills into their further studies and their work afterwards. Developing critical thinking will be a continuous process over their three years of study and into their life after university.

Our Australian Learning and Teaching Council (ALTC) project investigated how we could embed the teaching and learning of some of these skills into a business curriculum. This paper will expand on some of those ideas later.

## 4. Methodology

The "Embedding generic skills in a business curriculum" project team had as one of its aims to create resources and activities for academics in business to engage their students with four capabilities, namely critical thinking, teamwork, ethical practice and sustainability. Seven universities were participants in the project. The project team members were teamed up with one another to develop and review various activities.

These activities were initially tested in a workshop in Sydney in April 2009 with 35 students from seven universities. Student feedback from the workshop was used to refine and improve the activities. The various universities then chose activities to embed into their curricula in the second semester of 2009 and first semester of 2010. Further student workshops were held in Brisbane and Sydney, where the revised methods were used and evaluated again.

This paper focuses on the critical thinking activities and assessments that were developed as part of the project. Although there were many positive comments on the critical thinking component from the first workshop in Sydney, there were also students who thought that the teaching of the skills could have been more interactive and needed to involve more team activities. The resulting activities given below provide examples of how we can engage first year students in developing their critical thinking and meta-cognitive skills.

## 5. How do we develop and assess critical thinking in the first year?

The following subsections provide a few examples developed as part of the ALTC project that show how we can scaffold students' learning of critical thinking in their first year and make them more aware of the skills that they need for university and when they go into industry. These examples are all available in more detail from the graduate skills website at www.graduateskills.edu.au (Graduate Skills, 2010). They were tested in the project workshops or by embedding the activities in one or more of the universities.

### *5.1 Evaluation and analysis*

Students need to be able to analyse the quality of the sources that they propose to use. This is not a skill that they have developed in high school where newspaper opinion pieces are often used for analysing arguments and the analysis is based on the language used by the author to persuade the reader. It is important for students to learn to find, evaluate and use high-quality evidence to back up their arguments (Boud & Falchikov, 2005).

The first exercise (Method 1) helps students to evaluate the quality of sources on the Internet and enables them to identify potential bias on the part of the author or authors. It can be used as an introduction for students writing an essay or a report, or undertaking a group task in the classroom. On the graduate skills website it is the first task in a three-step process for writing an argumentative essay. It is based on the work of Walton and Archer (2004).

As mentioned previously, it is not only important to apply critical thinking skills but also to make the students aware that that is what they are doing so that they can develop their meta-cognitive skills and are able to apply the appropriate skill to unknown situations.

**Method 1 – Evaluating the quality of sources on the Internet**

Provide the students with a variety of sources (4-5) about a controversial topic in your discipline. Try to use newspaper articles, websites, Wikipedia and one or two peer-reviewed journal articles if possible.

Provide the students with a framework for evaluating the sources by asking them to answer the following questions:

- Who has written this source? Who has checked it to ensure it is correct?
- Why should I believe them? (Do they have any authority? Could they be biased in any way by belonging to a particular commercial enterprise or political party, for example?)
- Who is the intended audience of this source?
- What is the main point that the authors are trying to make in the source? What evidence are they using to justify their point of view?
- When was the source written and have things changed that would affect its validity?
- Where was the source written and is it applicable to your argument in your location?

Ask the students to write a reference for each of the sources in the appropriate format.

The purpose of the above exercise is threefold. Firstly, it helps the students learn to evaluate articles for the quality of the source; secondly, you can use their draft references as a starting point to have a short discussion in class on your referencing technique; and, thirdly, it ensures that they have all read the articles before undertaking any group activity that might follow (see Method 2 in this paper). The method can be adapted for topics that do not include an argument to achieve some other form of analysis. The resource is available on the graduate skills website at: http://www.graduateskills.edu.au/wp-content/uploads/2010/08/Argument-Essay_Introduction.pdf and contains a template that can be used for the activity (Graduate Skills, 2010).

*5.2 Analysis and synthesis of an argument*

Students need to learn to consider different points of view and to synthesise different points of view. The first exercise helped the students to think about the quality of the sources and to identify an argument and evidence to support that argument. The next exercise (Method 2) helps the students to work with other students to synthesise the information and to see connections between the different articles that they have read. The exercise allows the students to work together in a non-threatening way to draw a diagram of the argument. On the graduate skills website it is Task 2 of a three-step process in writing an argumentative essay.

**Method 2 – Analysis of an argument**

Put the students into small groups (2-4 people per group). Ensure that they learn one another's names. Ask them to create a poster that depicts the arguments for and against the issue. Provide them with large pieces of paper and coloured pens. The poster should match arguments and counter-arguments from the sources in some way. They can use a mind-map, columns or any creative method of doing this. They can cut out quotes and stick them onto the paper or paraphrase them. They should identify where each quote or paraphrased idea comes from by referencing it (according to the selected referencing method). The back of the poster should include the references written out in the format required at your university. They should also put stars next to arguments that they think are particularly well justified or important.

They might end up with a diagram such as the one in Figure 1, with the blocks in dark grey depicting the evidence to support the argument and those in light grey the counter arguments. All evidence should be referenced appropriately.

The purpose of this activity or assessment is to help them learn to analyse arguments and how to combine different people's ideas into one piece of work. By asking them to identify the best arguments they will need to discuss the arguments with one another. They also learn how to reference properly. The assessment can be adapted if it is not used with an argument to allow for synthesis of other information. The resource is available at: http://www.graduateskills.edu.au/wp-content/uploads/2010/08/Argument-Essay_Introduction.pdf

A follow-up activity to this exercise could be to ask the students, either individually or as a group, to write a short argumentative essay that is fully referenced.

*5.3 Reasoning individually and collaboratively*

It is not only important for students to be able to reason themselves, but also to be able to explain that reasoning to others. The quality of students' work will improve if they are given opportunities to discuss and argue their ideas in class (Kurfiss, 1988). Students need to be provided with opportunities to argue about issues and to reason with one another until they come to a consensus. This gives them opportunities to develop their arguments, articulate their evidence and hear the opinions of others. By developing these skills they will also learn to weigh up evidence, be open-minded and understand that better decisions are often made when combining the perspectives of a group.

Team-based learning promotes the active learning of students in small groups within the classroom with students being held accountable for pre-learning parts of the materials prior to coming to class. Group activities in class promote collaboration both within and between groups (Michaelson & Sweet, 2008). Inter-group activities are recommended to promote total-class discussion with groups defending their answers (Michaelson, Knight, & Fink, 2004).

Method 3 uses the Immediate Feedback Assessment Technique (Epstein Education, 2010) to promote collaborative decision making and discussion among students. Although multiple choice questions are much maligned they are useful in large classes and can be designed to help students improve their critical thinking. In some subjects where the application of logic is required, it may be worthwhile for the lecturer to spend some time discussing logical inference with the students.

**Method 3 – Developing critical thinking and logical thinking using the immediate feedback assessment technique (Epstein Education, 2010)**

Students pre-prepare for class by undertaking readings or studying a topic. In team-based learning (Michaelson & Sweet, 2008) they would then undertake a multiple choice test individually. After completing the individual assessment, they then answer the same questions as a group using the Immediate Feedback Assessment Technique (IFAT)*.

Students should discuss the answer and come to a consensus as to what the answer is; they then scratch the answer off and if it is correct a * will appear. If it is wrong, they should discuss it again and scratch their answer until they get the answer right.

The questions posed need to be carefully selected so that they are not straightforward and require the students to reason and argue with one another. This gives the students practice at defending their own reasoning and also possibly being convinced that someone else's answer is better than their own.

Student teams can appeal in writing if they believe that their answer is better than the one chosen by the lecturer. Their appeal should include evidence as to why their solution is better. This process helps them to develop their ability to propose an argument and defend their argument in writing (Carmichael, 2009).

The following two questions are examples of students needing to apply logical thinking:

Question 1

A sign on a shop window states: *"Up to 20% off absolutely everything"*

If I go into the shop to buy a shirt, what can I expect?

A. The price of my shirt will be 20% off the normal retail price.
B. There is a chance that my shirt will cost 20% less than the normal retail price.
C. The price of everything in the store will be 20% less than the normal retail price.
D. None of the above.

Question 2

The average literacy and numeracy test results of students in more affluent areas are higher than those for students in poorer areas. Schools in affluent areas are able to attract better quality teachers than those in the poorer areas.

This means that:

A. If we put better quality teachers into the poorer areas we will get better literacy and numeracy test results.
B. If we swap some of the teachers in the poorer schools with some of the teachers in the affluent schools we will get better equity between the schools.
C. Being able to attract better quality teachers may be one of the reasons why schools in those areas are able to attain better average literacy and numeracy results.
D. Schools in poorer areas should get more funding from the government.

Further information on this technique is available from the team-based learning website (Michaelson & Sweet, 2008); and the verbal skills activity at: http://www.graduateskills.edu.au/critical-thinking/ (Graduate Skills, 2010).

*5.4 Self-regulation*

Nicols (2009) maintains that students who can self-regulate are able to become more effective autonomous learners. Boud and Falchikov (2005) support this idea and propose that students need to learn a variety of skills to enable them to deal with an unknown future and become lifelong learners.

Students should be provided with opportunities for self-assessment, peer dialogue and engaging with feedback from the teacher in order to develop their skills at self-regulating their learning. In addition, they need to learn to evaluate their decision making, understand their own biases and make judgements about their own learning (Nichols, 2009; Boud & Falchikov, 2005).

Critical thinkers are able to evaluate their own work and that of others. They can reflect on the past and learn from it.

**Method 4 – Using rubrics and reflection as a means of self-regulation**

We often use rubrics as a way of evaluating students' work and usually provide them to students in advance to help them understand how they will be evaluated. We do not often ask them, however, to use rubrics to evaluate themselves.

Rubrics help students to understand the different criteria that we are wanting to develop and the levels that they will need to perform at to achieve at a PASS, CREDIT or DISTINCTION standard. Asking students to evaluate themselves as part of the assessment helps them to build their knowledge of the criteria as well as their understanding of what they need to do to get a good grade.

As an example, we might ask the students to evaluate their essays against the same criteria as the lecturer (see Table 1). They might then be given a small part of their grade for the essay to see how similar their evaluation was to that of the lecturer. In later years one might want to involve the students in developing their own criteria.

It is also useful to have students evaluate their performance when they work in teams. It is difficult for a lecturer to assess what is happening or has happened in a team, so having team members assess themselves and comparing what the different team members have said can raise the students' awareness of how teams should work as well as provide insight into the team processes. For example, the rubric in Table 2 addresses criteria about how students work collaboratively within the team. Three aspects are considered: giving feedback, respecting one another and managing conflict effectively.

## 6. Conclusion

Critical thinking has been identified as one of the key skills of a university graduate and most universities specify the ability to think critically or use higher order thinking as a desirable attribute of their graduates. As this knowledge cannot be assumed, it is important that business programs (and other discipline areas) develop critical thinking skills in the context of the discipline curriculum. As Forrester (2008) stated: "If the educational community is to encourage both creative and critical thinking, then students must be given the motivation to think, the time to develop ideas, and the collaboration and support of a learning community that provides information, feedback and encouragement." (p. 104)

This paper does not support the idea that teaching these skills individually will enable students to integrate them and use them appropriately. These skills are complex, and it is crucial that they be introduced in first year and further refined over the course of the program. "Critical thinking is more than the successful use of the right skill in an appropriate context. It is also an attitude or disposition to recognize when a skill is needed and the willingness to exert the mental effort needed to apply it." (Halpern, 2000, p. 72) This paper provides ideas of the skills the students need to develop and how we can integrate the students' understanding of those skills with their learning in the classroom and through their first-year assignments and activities. These examples and ideas have all been focussed on the first year student, and it would be expected that academics in the second and third year would build on these skills in order to produce graduates who are able to make good decisions, solve problems and evaluate solutions effectively.

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Table 1. General rubrics

| | Accomplished | Competent | Needs Improvement | Limited |
|---|---|---|---|---|
| **Justification of argument** | • Effectively supports team's point of view with well-reasoned, integrated argument. | • Presents and justifies a point of view but arguments are not clearly articulated. | • Presents a point of view but offers little support to justify their position. | • Fails to clearly present the team's point of view and is unable to justify it. |

These rubric criteria were developed by Michael Katims and Eeva Reeder (2000).

Table 2. Rubrics for assessment of teamwork

| | Accomplished | Competent | Needs Improvement | Limited |
|---|---|---|---|---|
| **Feedback, Mutual Respect, & Conflict Resolution** | • Team members provide and use constructive feedback to improve their product / performance. | • Constructive feedback is mostly accepted and used for improvement. | • Feedback given is not always constructive, is not usually sought out, and is often questioned. | • Feedback is generally not asked for nor given; criticism is not accepted. |
| | • Team members work collegially, sharing ideas, information and suggestions to better accomplish the task. | • Team members work collaboratively, though some members feel more free to contribute than others. | • Team members work in part as individuals or small groups, so some team members don't receive information or ideas. | • There is little or no teamwork as individuals or groups work independently; no communication / coordination. |
| | • Team conflicts are resolved with minimum disruption to work. | • Team conflicts are resolved, though with some disruption to work. | • Team conflicts often disrupt work and may require intervention. | • The team is generally unable to resolve conflicts without help. |

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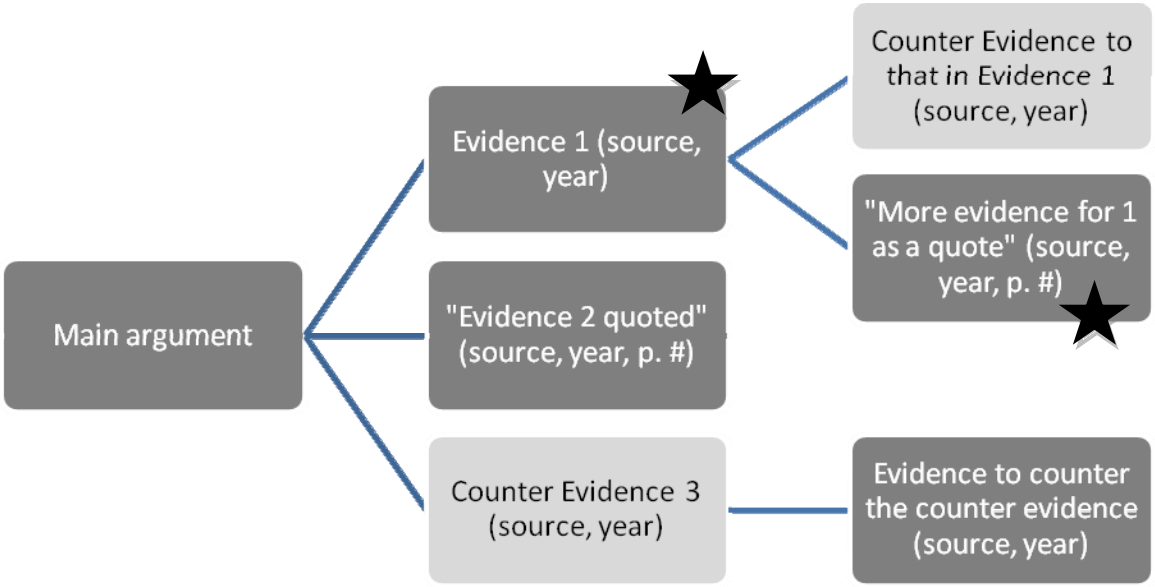



Figure 1. Analysis of an argument