The effects of social media on cognitive development in undergraduate economics students

Ling Ting and Naiefa Rashied

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Abstract

The study attempts to evaluate the effectiveness of social media on cognitive development among undergraduate economics students at a South African university. The study collects data on student postings to discussion topics posted on Facebook and Twitter. The use of 3 well-known rubrics for evaluating cognitive development: Garrison, Anderson, and Archer (2001), revised Bloom’s taxonomy (Anderson et al. 2001), and Greenlaw and Deloach (2003), are used. Results indicate that student posts fall mainly into lower levels of thinking suggesting that social media may not be effective in cultivating critical thinking. Moreover, these results shed light on the voluntary versus mandatory nature of participation, the time length for student responses, and “big think” style questions in a developing country context (i.e. poor internet).

Keywords: Social media, teaching and learning, critical thinking
JEL Classification: A20, A22

1 INTRODUCTION

The increased use of social media among students has led to universities integrating social media into their teaching and learning toolkits (Blankenship 2010; Bell 2011; Chen and Bryer 2012; Moran, Seaman, and Selwyn 2012 and Langmead 2013). On the one hand, social media is said to have a negative relationship with academic performance (Jacobsen and Forste 2011). On the other hand, social media is said to have the potential to increase a student’s learning and ‘cognitive ability’ within a social framework (Bell 2011; Chen and Bryer 2012). Universities such as Harvard, Columbia and John Hopkins are among

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the top five universities in the United States that have intensely integrated social media, in various forms, into their students’ academic life (Langmead 2013). Following the footsteps of these universities, the University of Johannesburg has recently embarked on an intense campaign to actively introduce social media, among other tools, as part of its technology-enabled teaching and learning strategy. Among the most popular social media platforms are Facebook, YouTube and Twitter (Moran, Seaman, and Tinti-Kane 2011). The explosion of social media has resulted in higher education institutions utilising this medium to both market and engage more effectively with students and potential students (Kim and Bonk 2006; Blankenship 2010; Moran, Seaman and Tinti-Kane 2011; Selwyn 2012 and Langmead 2013). Given the volume of first generation, that is, ‘technologically-fluent and digitally literate’ students enrolled at universities, the trend to keep up and capture their attention to promote both a well-balanced and well-informed student life is impressive. Furthermore, engaging with these first generation students in mediums which are more familiar to them has become increasingly important (Ulbrich et al. 2010; Chen and Bryer 2012 and Selwyn 2012).

University students, on average, spend 18 hours a week on social networking (Huang and Capps 2013). Both male and female students spend similar amounts of time checking their Facebook feeds (Aghazamani 2010; Baylor University 2014). Since a student spends much of their time on maintaining and multi-tasking their social presence, social networks, and university studies (Jacobson and Forste 2011; Selwyn 2012), the use of social media in faculty teaching and student learning is considered to be potentially more engaging and effective to reach many students (Bell 2011; Chen and Bryer 2012). The use of social media among faculty staff also shows similar perceptions - that it is important to update your social presence in addition to using this medium in teaching, and in faculty staff’s own-learning (Moran, Seaman, and Tinti-Kane 2011). Furthermore, the future demand of online teaching and learning is perceived to grow exponentially (Kim and Bonk 2006).

Since students are active and engaging in these forums, it is believed that using these platforms can help to encourage students to think more critically with regards to their course content (Jones 2011, Hsia, Chen, and Hu 2013). One reason is that students have more time to engage in reflective learning. In addition, social media promotes collaborative learning (peer-to-peer and lecturer-to-many students), and since social media is a public forum where statements posted are long lasting, discussions are expected to be more meaningful and thoughtful (Hsia, Chen, and Hu 2012).

Studies that have tested whether critical thinking is cultivated have used online discussions, that is, topics relevant to the course outlines are posted up for a length of time so that students can respond (Garrison, Anderson, and Archer 2001; Greenlaw and Deloach 2003; Meyer 2003; Meyer 2004; Pena and Almagner 2012). To ensure participation, online discussions were mandatory and graded by the lecturer. These studies primarily used the university’s communication management systems (such as blackboard) and not social media platforms. Although these studies showed some success in motivating students
to think critically, the success was highly dependent on the rubrics used and the clarity of the rubric’s descriptions in identifying elements or evidence of critical thinking. This entire process is a rather subjective process. However, studies such as Greenlaw and Deloach (2003) and Meyer (2004) have shown that Garrison, Anderson and Archer (2001), revised Bloom’s taxonomy (Anderson et al. 2001) are good examples of rubrics which grade cognitive development well. Furthermore, as Meyer (2004) argued, these rubrics are user-friendly for the lecturer and do not require any costly hiring of trained coders.

It is not known from the abovementioned studies whether the use of social media is more effective in motivating first generation\(^1\) students to reach higher levels of thinking compared to other communication systems. It is also not known whether this voluntary approach – since social media is open and public, and student responses cannot be tracked –, and open learning environment could be conducive for critical thinking. Additionally, it is not known whether the format of questions posed for students could also affect critical thinking. Since online discussion topics are asked in a step-by-step format; so as to provide guidance for students, for example Greenlaw and Deloach (2003); an additional aspect to assess is whether changing the question format to a “big think” style could also impact the use of online discussions in achieving higher levels of cognitive development (McGoldrick and Garnett 2013).

Furthermore, this study is set in a developing country context as the study was conducted at a South African university. It is the first study, to the best knowledge of the authors, to explore whether using social media is effective among university students in a developing country where broadband is a problem (UN Broadband Commission 2014).

This study intends to explore the use of social media platforms (Facebook and Twitter) in enhancing higher order critical thinking in economics undergraduate students. Additionally, the study seeks to understand whether social media has a presence in South African universities, whether changing the style of questioning (“big think”) could impact cognitive development, and the effects of a voluntary scenario versus a mandatory scenario on critical thinking. The study attempts to answer the question by collecting data on the number of posts posted by the economics lecturers of a first year economics course, and student responses to the posts over a semester. To assess whether some critical thinking has taken place, the study proposes to use the rubrics of Garrison, Anderson, and Archer (2001), Greenlaw and Deloach (2003) and revised Bloom’s taxonomy (Anderson et al. 2001). The paper does not attempt to directly compare the communication system of the university with social media but to rather explore whether social media can be used as an additional tool for enhancing cognitive learning.

\(^1\)A note to make here is that a first generation student in a developing country context refers to a student that is a first time university student. Hence to refer to a technologically literate student, we will replace the words “first generation students” with “21st century students”. 
2 MEASURING COGNITIVE DEVELOPMENT IN SOCIAL MEDIA

There are few studies that have evaluated the use of social media for cognitive development among university students. These studies include those by Bell (2011), Chen and Bryer (2012) and Jacobsen and Forste (2011). Chen and Bryer (2012) investigate the use of online social networks among faculty staff at an American university to try to understand whether the perceptions of this medium could and should be used as a tool for student learning. The findings indicate that these mediums can be used as a tool especially for informal learning and formal learning where structure and guidance is provided by the lecturer or during a lecture. Bell (2011) and Jacobsen and Forste (2011) also explored uses of social media through the evaluation of new social learning theories, and correlations between social media and grades, respectively. However, these studies did not test whether social media has the potential to enhance critical thinking among university students.

On the other hand, studies that have tested cognitive development among university students and the use of online tools were not clear about the nature of the online system i.e. whether social media or an alternative online tool was used. These studies include Garrison, Anderson, and Archer 2001; Greenlaw and Deloach 2003; Meyer 2003; Meyer 2004; Pena and Almaguer 2012. In these studies, the online communication platforms utilised was the university’s communication management system, although the methodology for testing cognitive development through an online communication system made use of rubrics, as in this study. Discussion topics, which are relevant to the course work and require logic, argument and substantiation, were posted via these systems. Major differences between a communication management system and a social media platform is the openness and publicness of social media resulting in potentially unregistered student participation (although highly unlikely for critical thinking topics) and the inability to effectively track students. Inability to track students, student accounts are personal, can lead to two things: an intertwining of the personal and professional space of lecturers and students and the voluntary nature of participating in social media discussions since students would choose to join the page or not.

Considering the latter, our study proposed an incentive system in the form of a competition to win a book prize (more details in section 3) to incentivise students to participate. We found our students were open to liking and joining the page without hesitation. Considering the topic of personal and professional space, a Gmail account was created to post topics through this account without using our personal details. Hence, we felt that this was sufficient enough to separate personal and professional space.

Since the abovementioned studies tested for cognitive development by using online or electronic discussions and found evidence of cognitive development occurring in students, this study follows their methodologies. Studies by Greenlaw and Deloach (2003), Meyer (2003, 2004), and Pena and Almaguer (2012), fol-
owed similar procedures. Discussion topics were posted via the communication system and students were given time to respond (time lengths given for responses differ substantially). The studies were usually conducted over a semester with some studies repeating the same experiment in the following semester such that the length of the study became two years. The student responses were then evaluated using a series of rubrics.

The crucial part of the experiment was the choice of the rubric/s. In assessing the student response posts, the identification of elements of cognitive development (or higher order thinking) is rather difficult, subjective and can be confusing. This study takes advantage of all the rubrics used in the abovementioned studies as the rubrics used overlapped in both use and definitions. These rubrics were detailed and also covered many teaching pedagogies.

The first rubric the study employs is that of Garrison, Anderson and Archer (2001), which derives its rubric from social learning theories. This and the following rubric have been tested by Meyer (2004) and found to assess cognitive development well. The next rubric is based on Bloom’s taxonomy, but it is a revised version to include technological learning aspects (Anderson et al. 2001). Finally, the last rubric used is that of Greenlaw and Deloach (2003) which is based on Perry’s framework. The use of all 3 rubrics covers the teaching pedagogies quite well and it also aids in robustness checks; whether the outcomes of all three rubrics are similar or different and if there are differences, can they be explained or not. Also, the three rubrics are rather detailed with studies explaining the identification of elements of cognitive development. It is important to note that some postings that do not fall under any of the levels described in the three rubrics are not categorised such as posts that describe a status that is social and not relevant to the discussion.

The rubrics and descriptions for each cognitive level can be observed in Tables 1, 2 and 3.

3 METHODOLOGY

This study uses a qualitative approach to assess the level of cognitive development of undergraduate economics students. The study follows similar methodologies to Meyer (2004), and Greenlaw and Deloach (2003) where online discussion topics were posted through the chosen platforms. In this study, Facebook and Twitter are the social media platforms used. Discussion topics were directly linked to what was happening in the real-world by hyperlinking newspaper articles (sources included The Economist and various other financial magazines and websites) and questions were typically phrased in an opinion provoking format that is “What do you think of . . . ?” with little guidance, following the “big think” style of questions (McGoldrick and Garnett, 2013). Occasionally, helpful hints were included in the question such as “Hint: Think about ... theory.” Instructors provided minimal feedback; feedback was only prompted to focus the discussion and encourage more engagement. Both Facebook and Twitter were public pages and open to all economic students. However, advertising of these
social media platforms was specific to first year students. The advertisement of these pages was included at the bottom of each lecture slide so that students were aware that such pages existed and could be used to engage with the module content, post questions and apply economic theory. The two social media platforms existed in addition to Blackboard, which is also used as a communication tool between instructors and students at the University of Johannesburg. Each social media page had its own manager. To incentivise student participation under this voluntary scenario, a competition with gift certificates (book vouchers) was promoted once every two weeks. The students were reminded that prizes were given to those who participated in the online discussions through thoughtful argument (so quality and not quantity was judged). All posts, both discussion topics and student responses, were analysed and the student responses were graded by each of the social media managers to compare and conclude overall findings.

4 DATA

Unlike the abovementioned studies by Greenlaw and Deloach (2003), Meyer (2003, 2004), and Pena and Almarguer (2012), discussion topics were posted more frequently: weekly, data in the form of student responses, was collected over the first semester period from February 2014 until May 2014 (before exams and make-up tests which typically take place towards the latter half of May), and thus the length of the study was much shorter. Below is a summary of the number of posts, discussion threads, frequency and length of posts in Table 4.

From our findings we could observe that our students seemed to use Facebook more than Twitter; the number of followers and likes, “likes” on Facebook and the number of “followers” on Twitter, were over 581 likes and 108 followers, respectively. Since Facebook had the larger number of likes, equivalently followers in Twitter terminology, it was decided that the postings from Facebook would be focused on. Also, although Facebook appeared to have more active engagement from students, student uptake of discussions were slow as can be seen from the frequency of student responses. This finding is similar to other studies such as Chen and Bryer (2012). The proportion of students engaging in these pages was also low (37 participants out of a total of 1900 potential participants, roughly 2% of students).

The number of posts related to microeconomics (and economics in general) generated for each page was also tracked. There was a minimum of one post to as many as six posts per week since February 2014. Occasionally, multiple posts were made by the Facebook manager on one day. The content of the discussion posts is summarised in Table 5.

The discussions posted were sometimes closely related to the microeconomics topics students encountered during lectures each week. For instance, some posts related to demand and supply, in particular, the price of agricultural products and coffee beans. However, topics varied to include more general economic discussions that were relevant at the time such as the announcement of an
increase in inflation in South Africa (released by Statistics South Africa) or
the emergence of China as the world’s next super power. From the instructors’
perspective, the topics posted were viewed as related to the real world and to the
students’ coursework. Instructors’ topics were perceived as challenging enough
to extend the student’s thinking beyond the classroom.

5 RESULTS AND DISCUSSION

The results indicate that some level of cognitive development took place during
the first semester study period. There was active engagement from a small
proportion of students (just under 2% out of the total first year population).
Student postings ranged from general yes or no responses to detailed arguments
using economic theory from the prescribed textbook, internet sources for em-
pirical evidence and quotations from previous student posts.

Most of the posts were categorised into the lower half of the critical thinking
levels, that is, most student engagements reached application or analytical but
were not yet critical thinking. Students were able to analyse the questions, use
appropriate economic theories (for example, demand and supply) and logically
argue their points in a linear manner. However, in achieving the highest critical
thinking level, only a few posts were able to “test the validity of their solutions
using a real-world example” (Garrison, Anderson and Archer 2001), “organise
information in a different way or create alternative solutions” (Anderson et al.
2001), or to integrate personal values (“subjective interests”) substantiated by
economic theory and evidence to provide a way forward (Greenlaw and Deloach
2003).

In general, students struggled to make detailed posts. They either merely
asserted their views as fact without substantiation or they provided correct
reasoning resulting in a plausible solution but didn’t reach the highest level of
critical thinking which required some reflection of the theory, evidence and their
personal values (level 6 of Greenlaw and Deloach 2003 and Anderson et al. 2001
and level 4 of Garrison, Anderson and Archer 2001).

Scores resulting from the rubrics show that the majority of students reached
level 2 in the 4-level rubric (half way), level 1 and level 3 (also half way) in
Greenlaw and Deloach (2003) and Anderson et al. (2001) respectively (refer to
Table 6).

A possible reason for this difference is that in the 4-level rubric, level 2 de-
scriptors include students presenting different ideas or opinions. Many of the
student postings offered their own views of approaching and thinking about the
problem question, which was rather unique. They also offered their views in
either a positive or negative light (disagreeing or agreeing with the news-
paper article), which overlaps with the level 1 descriptors of the Greenlaw and
Deloach (2003) rubric. Although some analysis took place, there was evidence
that students applied themselves whole-heartedly to understanding the question
by using other knowledge they had discovered instead of economic knowledge.
This application level falls into the level 3 descriptors of the revised Bloom’s
taxonomy (Anderson et al. 2001). Hence, the differences mainly arise from the descriptors where ideas and opinions that are unique showing evidence of curiosity (“inquisitiveness”) is shown in the 4 level rubric while the revised Bloom’s taxonomy values the application of knowledge (not specifically to economics). On the other hand, Greenlaw and Deloach (2003) is seeking the application of economic concepts and assumes that without these, critical thinking cannot be reached.

However, the upper half of the rubric results appears to overlap across the three taxonomies: analysis/inference-making/evaluation, creation/resolution, and merging/integration share similar descriptors in recognising higher order thinking. It must be noted that the Greenlaw and Deloach 2003 rubric is stricter since higher order thinking cannot be scored without the use of economic theory and empirical evidence, thus the lower numbers at the higher levels of critical thinking are observed.

Other studies that have tested the use of online discussions have found that online discussions provide time for increased engagement, more detailed arguments and personal reflection of both theory and application, which serves as proof that more critical thinking takes place (Garrison, Anderson, and Archer 2001; Greenlaw and Deloach 2003; Meyer 2003; Meyer 2004 and Pena and Almaguer 2012). However, our findings do not reflect those of the abovementioned studies. The results of our paper show that lower levels of cognitive development occur when using online discussions compared to the abovementioned studies. This may be explained mainly by the voluntary and incentive-driven nature of the study, as online participation was not mandatory – unlike the abovementioned studies where online discussions formed part of the grade for the course. Also, the unstructured or “big think” style of questions used, following McGoldrick and Garnett (2013), which was dissimilar to the abovementioned studies, did not provide a step-by-step answer guide but allowed for the student the freedom and creativity to formulate a solution. Lastly, the fact that broadband penetration is low in South Africa (UN Broadband Commission 2014), which may have contributed to the low engagement in addition to the affordability of smart devices among South African university students.

When comparing the total number of student postings in our study to other studies, this study only used 62 posts and 25 online discussion topics over a semester. This is relatively small when compared to the closest comparable studies of Greenlaw and Deloach (2003) and Meyer (2004) who had average of 200 posts for each of the 10 discussion topics over a two semester period and 278 posts and 17 discussion topics over two semesters respectively.

Therefore, if one had to compare the average number of posts to discussion topics, this study has less than 2.5 posts per topic while Meyer (2004) had 16 posts per topic and Greenlaw and Deloach (2003) had 200 posts per topic. If we had to categorise the numbers per semester, our study remains at 2.5 posts per topic while Meyer (2004) had 8 per topic and Greenlaw and Deloach (2003) had 100 per topic. The large number of posts in Greenlaw and Deloach (2003) compared to Meyer (2004) could be attributed to the “bonus” grade incentive applied in the Greenlaw and Deloach (2003) study. Furthermore, students
could retry or continue commenting to improve their grades through the online discussions. In comparison, the sample size used in this study is small.

This may imply that a mandatory scenario where posts form part of the student’s grades, and bonus marks could be earned would be a better incentive than our competition “win-a-prize” framework. Furthermore, the use of the social media platform Facebook, although drawing on hundreds of “likes” (581) over a semester, did not encourage more participation when compared with the sample sizes of Greenlaw and Deloach (2003) and Meyer (2004) where university communication systems were used to facilitate online discussions. This may indicate that social media may not be as effective and engaging for higher order thinking, although it may be the language of 21st century university students. Although, our findings may suggest this, a more reasonable factor could be that South Africa’s broadband penetration and usage is very low compared to the other comparable studies (most of which were conducted in developed countries). Also, our university students may be at a financial disadvantage (the distinction between developed and developing countries is rather obvious) and therefore, cannot afford smart devices that connect to the internet and consequently, may show little interest in online discussion participation. A last factor that may also have contributed to the low interest (quantified by the small number of posts) is the way we did not structure our questions.

Following the study of McGoldrick and Garnett (2013), we tried to experiment with giving students more freedom and creativity to come up with solutions which would not be formulaic or textbook bound. Therefore, we asked them a question related to a hyperlink of a newspaper article and generally asked for their views, reminding them to include economic theory into their views. Perhaps this unstructured approach was too unstructured for the undergraduate student, especially at a first year level such that it may have overwhelmed some interested students. All posts were posted by various students such that there was never one poster which dominated the conversation – unless there was only one post in a single thread. Since there was no evidence of bullying on the Facebook page, students may have felt intimidated as a result of the “big think” style of questioning than rather from an intimidating peer.

Finally and on a more positive note, student postings indicated topic preferences among students in their response time to other student postings. The topics that they showed interest in were expectedly those closely related to their course work such as demand and supply topics, which we found our students enjoyed and understood rather well, and world economic news, in particular, the rise of China as an economic super power and the implications of this for the United States. The latter topic was a rather controversial one hence we suspect our students liked to argue certain points to provoke responses for fun. Our student’s response times to peers was rather quick with an average response time of 10 minutes, especially when opinions diverged and debates became rigorous.
6 CONCLUSIONS AND RECOMMENDATIONS

The study attempted to evaluate whether the use of social media platforms such as Facebook could enhance higher order critical thinking among South African undergraduate economics students. The study was motivated by two factors: firstly, the volume of 21st century students attending university and secondly, the increased use of social media in teaching and learning. Additional objectives were to understand whether social media is an effective tool to engage with students in a developing country context, the value of unstructured or “big think” questions, the effectiveness of social media when compared with university communication systems, and the incentive-driven or voluntary scenario when compared to a mandatory scenario for online discussions via social media.

The study found that most student posts reflected lower levels of thinking in our online discussions via social media when compared with other comparable studies, which found higher order thinking. This result could be explained by the small sample size used in this study (number of posts), which was influenced by a number of factors. Firstly, our time period was shorter (over one semester) compared with other studies (over two semesters). Secondly, our voluntary and competition framework did little to boost participation when compared with the mandatory scenarios in other studies. Thirdly, our unstructured “big think” questions could have been intimidating or overwhelming to undergraduate students. Fourthly, our broadband penetration and usage in South Africa is low and our students may not always have internet access. Following from this, our fifth factor could be that our students cannot afford smart devices.

Overall, our study showed that although there were a few posts that displayed evidence of higher order thinking, the majority of posts fell into the lower order thinking levels. Using social media, in the voluntary sense, did not increase engagement. This finding may suggest that even though social media is the social language of our students, they may not recognise it as a part of their learning tools and thus as a part of their academic studies. However, our study is limited by our small sample size, and our short time period. It is hoped that we can extend our study to include a longer length of time and change the voluntary, competition driven scenario to a mandatory scenario in order to more robustly understand the effectiveness of social media in a developing country context.

References


onomy for Learning, Teaching, and Assessing: A Revision of Bloom’s Taxonomy of Educational Objectives. New York, MA: Longman.


TABLE 1: Rubric assessing cognitive presence (Garrison, Anderson, and Archer 2001)

<table>
<thead>
<tr>
<th>LEVEL/ELEMENT</th>
<th>DESCRIPTION</th>
<th>RATING/SCALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Triggering</td>
<td>Evocative: Asking questions, recognising the problem by presenting background information</td>
<td>1</td>
</tr>
<tr>
<td>Exploration</td>
<td>Inquisitive: Search for and offering of information, presenting different ideas/opinions, brainstorming, leaps to conclusions</td>
<td>2</td>
</tr>
<tr>
<td>Integration</td>
<td>Tentative: Construction of possible solution, connecting ideas, creating possible solutions, building on previous posts, substantiation</td>
<td>3</td>
</tr>
<tr>
<td>Resolution</td>
<td>Committed: Critical assessment of solution - testing and applying their solutions by using real world examples</td>
<td>4</td>
</tr>
</tbody>
</table>

Source: Authors’ adaptation from Garrison, Anderson, and Archer 2000

TABLE 2: Revised Bloom (Anderson et al. 2001)

<table>
<thead>
<tr>
<th>LEVEL/ELEMENT</th>
<th>DESCRIPTION</th>
<th>RATING/SCALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remembering</td>
<td>Recalling facts, terms, basic concepts and answers</td>
<td>1</td>
</tr>
<tr>
<td>Understanding</td>
<td>Demonstrating understanding of facts and ideas by interpreting and describing main ideas in one’s own words</td>
<td>2</td>
</tr>
<tr>
<td>Applying</td>
<td>Solving problems by acquiring applied knowledge, facts, techniques and rules in a different way</td>
<td>3</td>
</tr>
<tr>
<td>Analyzing</td>
<td>Examining information and making inferences and finding evidence to support generalisations</td>
<td>4</td>
</tr>
<tr>
<td>Evaluating</td>
<td>Presenting and defending opinions by making judgements about information or quality of work</td>
<td>5</td>
</tr>
<tr>
<td>Creating</td>
<td>Organising information in a different way or proposing alternative solutions</td>
<td>6</td>
</tr>
</tbody>
</table>

Source: Authors’ adaptation from Anderson et al. 2001, 67–68
### TABLE 3: The Greenlaw and Deloach 6 level rubric

<table>
<thead>
<tr>
<th>LEVEL/ELEMENT</th>
<th>DESCRIPTION</th>
<th>RATING/SCALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 0</td>
<td>Off-the-subject or otherwise unscorable</td>
<td>0</td>
</tr>
<tr>
<td>Unilateral descriptions</td>
<td>Students paraphrase, repeat and restate the question, define terms Simple “good” or “bad” statements, Add little or nothing new to the issue or question</td>
<td>1</td>
</tr>
<tr>
<td>Simplistic/Alternative arguments</td>
<td>They take a side but do not explore other alternatives, make unsupported assertions, simplistic arguments e.g. giving an example, An assertion, without evidence, often in the form of a question, Cite simple rules, “laws” as proof Do not address conflicts with opposing views or do not explore them</td>
<td>2</td>
</tr>
<tr>
<td>Basic analysis</td>
<td>Attempt to analyse an argument or competing arguments and evaluate it/Them with evidence, casual observation, anecdotal, datum (vs. data) Assertions with explicit evidence offered, often list numerous factors as evidence but do not integrate them within a logical framework, no clear conclusion or choice made</td>
<td>3</td>
</tr>
<tr>
<td>Theoretical Inference</td>
<td>Employ the use of (economic) theory to make a cohesive argument, logical statements based on the discipline’s accepted model/school(s) of thought, identify assumptions, challenge a key assumption of another’s theory,</td>
<td>4</td>
</tr>
<tr>
<td>Empirical Inference</td>
<td>Introducing empirical evidence; historical data to “test” the validity of an argument, use data to reach a clear conclusion or to choose between alternative, challenge the validity of another’s empirical measures/evidence</td>
<td>5</td>
</tr>
<tr>
<td>Merging values with analysis</td>
<td>Able to move beyond objective analysis to incorporate subjective interests, argue that although there is (positive) evidence to validate the use of a particular policy, there are other (normative) consequences that must be considered; select a particular policy on some normative basis, from several using positive evidence to support</td>
<td>6</td>
</tr>
</tbody>
</table>

*Source: Greenlaw and Deloach 2001*

### TABLE 4: Summary Statistics

<table>
<thead>
<tr>
<th></th>
<th>62</th>
</tr>
</thead>
<tbody>
<tr>
<td>N Sample size (no. of posts)</td>
<td>62</td>
</tr>
<tr>
<td>No. of posts to no. of discussion threads</td>
<td>62 to 25</td>
</tr>
<tr>
<td>Average no. of posts to no. of discussion threads</td>
<td>3 to 2</td>
</tr>
<tr>
<td>No. of Posters</td>
<td>37</td>
</tr>
<tr>
<td>Frequency of responses (how long did it take students to respond)</td>
<td>on the day to 2 weeks later</td>
</tr>
<tr>
<td>Length of responses (paragraphs, 1 liners)</td>
<td>on average 1 paragraph</td>
</tr>
</tbody>
</table>

*Source: Author’s own*
### TABLE 5: Discussion topics and themes per discussion post

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>CONTENT OF POSTS</th>
<th>THEMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short (1 sentence, 10 words and less)</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Long (More than 1 sentence/ hyperlinks/YouTube videos)</td>
<td>96%</td>
<td></td>
</tr>
<tr>
<td>General (Budget Speech, China)</td>
<td></td>
<td>48%</td>
</tr>
<tr>
<td>Economy (Intro to Micro)</td>
<td></td>
<td>8%</td>
</tr>
<tr>
<td>Demand and Supply</td>
<td></td>
<td>8%</td>
</tr>
<tr>
<td>Elasticity</td>
<td></td>
<td>4%</td>
</tr>
<tr>
<td>Production &amp; Costs</td>
<td></td>
<td>4%</td>
</tr>
<tr>
<td>South African Economy</td>
<td></td>
<td>24%</td>
</tr>
<tr>
<td>Market Structures</td>
<td></td>
<td>4%</td>
</tr>
</tbody>
</table>

*Source: Authors’ own*

### TABLE 6: Comparison of Rubric Outcomes

<table>
<thead>
<tr>
<th>RATING/SCALE</th>
<th>4 LEVEL COGNITIVE PRESENCE</th>
<th>6 LEVEL GREENLAW AND DELOACH</th>
<th>6 LEVEL REVISED BLOOM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Actual Posts</td>
<td>Expected posts</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>NA</td>
<td>NA</td>
<td>7</td>
</tr>
<tr>
<td>1</td>
<td>13</td>
<td>18.3% of 62 = 11</td>
<td>24</td>
</tr>
<tr>
<td>2</td>
<td>25</td>
<td>27% of 62 = 16</td>
<td>14</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
<td>32.4% of 62 = 20</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
<td>19.8% of 62 = 12</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>NA</td>
<td>NA</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>NA</td>
<td>NA</td>
<td>1</td>
</tr>
<tr>
<td>Not categorised</td>
<td>11</td>
<td>2.5% of 62 = 1</td>
<td>13</td>
</tr>
</tbody>
</table>

*Source: Authors’ own*