Undergraduate Students' Level of Need for Cognition and its Relation to their Meaningful Cognitive Engagement: A Framework to Understanding Students' Motivation.

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**Abstract**

This study aimed at identifying the level of need for cognition (NFC), and explored the differences between students with high need for cognition and students with low need for cognition in meaningful cognitive engagement. Additionally, it examined the relationship between need for cognition and meaningful cognitive engagement among undergraduate students. University students (N= 361) completed the Need for Cognition and Meaningful Cognitive Engagement Scales in the academic year 2012/2013. Results showed that the level of need for cognition was high. Also, results showed that students with high need for cognition more meaningful cognitive engagement than students with low need for cognition. NFC was found to be significantly and positively related to meaningful cognitive engagement.

**Keywords:** Need for Cognition, Meaningful Cognitive Engagement, University Students.

**Introduction**

The construct of need for cognition emerged when Cohen, Stotland, and Wolfe (1955) conducted studies on cognitive motivation. They described the need for cognition as a need to structure a situation in a meaningful way to help people understand the complex world in which they live (Coutinho, 2006; Stedman, Irani, Friedel, Rhoades, & Ricketts, 2009). An individual’s need for cognition relates to how they think about events in a holistic manner. Moreover, Need for cognition (NFC) is the term applied to a construct seeking to explain how motivated an individual is to participate in, and enjoy situations requiring effortful thinking (Cacioppo & Petty, 1982). According to (Cacioppo, Petty, Feinstein, Jarvis, & Blair 1996) all people try to make sense of the world in which they live, whereas low and high NFC individuals do so in different way. For example, Individuals with high NCF have a large tendency to engage in and enjoy effortful cognitive endeavors.

A critical component of need for cognition is the willingness to engage in effortful cognitive activities. Specifically, extensive empirical evidence suggests that NFC is positively related to effortful information processing. This means, Need for cognition (NFC) reflects motivation to expand effort on learning outcomes; such as, problem solving, reasoning, gathering information, and cognitive
engagement. Need for cognition is often assumed to reflect an intrinsic desire to engage in challenging cognitive activity (Steinhart & Wyer, 2009).

In general, one of the critical influences on students' cognitive engagement is their need for cognition. NFC is important in the acquisition and processing of information. Thus, individuals with a high NCF tend to be intrinsically motivated to explore strategies despite the cognitive challenges in problems (Day, Espejo, Kowollik, Boatman, & McEntire, 2007). Berzonsky & Sullivan (1992) realized that NCF refers to the tendency to seek out relevant information through problem solving process. Specifically, individuals with high NCF tend to memorize and recall more information to which they were exposed about the problems that they countered (Bertrams & Dickhauser, 2009).

Also, individual's motivation to process cognitive information differs as level of need for cognition: individual with high- NFC seem to enjoy complex tasks requiring mental effort and appear better able to concentrate on the task as hand. In addition, Individuals who are high in NFC are intrinsically motivated to think, seek out and enjoy complex cognitive tasks (Coutinho, 2006; Stedman, Irani, Friedel, Rohades, & Ricketts, 2009). On the contrary, Individuals who are low in NFC appear to prefer simpler tasks requiring less mental effort and concentration (Claxton & McIntyre, 1994). Moreover, Individuals who get high score on need for cognition scale tend to think more and develop and interpret data, while individuals who get low score on need for cognition wish to avoid cognitive activities (Culhane, Moreira, & Hosch, 2004).

In addition, High need for cognition students attain superior academic achievement as compared to low need for cognition students (Sadowski & Gulgoz, 1992; Waters & Zak rajsek, 1990). Moreover, research into motivation has indicated a number of important theoretical frameworks that account for students' success in academic learning, notably achievement goals, and cognitive processing strategies (Elliot, McGregor, & Gable, 1999; Dweck & Leggett, 1988). Individuals differ in the way they process information. An individual's learning strategies to information processing can be influenced by him/his need for cognition. Individual with a high need for cognition are likely to seek, acquire and reflect on information proactively in order to make sense of stimuli and events (Cacioppo, Petty, Feinstein, Jarvis, & Blair (1996). On the contrary, individuals with a low need for cognition usually rely on others to determine the meaning of information and situations, they are less interested in effortful cognitive activities (Cacioppo, Petty, & Morris, 1983).

Cognitive engagement represented how students organize learning tasks and how they determined when and how the learning tasks would be completed. Students who engaged meaningfully, like those high in need for cognition, seek out information, think about it and reflect on it to make sense of the information and to make connections with prior knowledge. Meaningful cognition involves relating the new information to one's existing knowledge; thus creating a more complex knowledge structure (Kardash & Amlund, 1991). And so, meaningful cognitive engagement has been defined as strategy use that combines meaningful processing and self-regulatory strategies such as planning and checking one's work (Greene and Miller, 1996). Schunk (1990) argued that students who possess and engage in meaningful cognitive strategies enhance their current perceptions of ability and are more likely to utilize the same meaningful cognitive strategies in the future. In addition, Coutinho (2006) realized that students who are high in their NCF have been shown to use more elaborative learning strategies which lead to a better and meaningful understanding of materials. In the present study, we our measure of cognitive engagement focused on the use of meaningful strategies.

Previous literature indicates that need for cognition has initial role in cognitive engagement. Also, there is some evidence in support of the notion that ability to process increases with increasing NCF (See, Petty, & Evans, 2009). Based on the influential "levels of processing" theory; we believe that students with higher need for cognition are experienced higher cognitive engagement in classroom. Although there is a wealth of research, however, have reported a direct association between the need for cognition and other aspects of outcome of learning, such as critical thinking and problem solving (Cacioppo, Petty, & Morris, 1983; Stedman, Irani, Friedel, Rohades, & Ricketts, 2009), no research to this date has established a direct connection between meaningful cognitive engagement and
the need for cognition. In order to further investigate the relationship between need for cognition and meaningful cognitive engagement, we conducted this study to examine the relationship between need for cognition and meaningful cognitive engagement. In sum, the findings of this study should enhance our understanding of motivation among university students, specifically their need for cognition and its relationship to meaningful cognitive engagement.

**Purpose and Objectives**
The purpose of this study was to examine the university students' level of need for cognition. The study also aims to determine if a relationship exists between need for cognition and cognitive engagement. More specifically, the present research addressed three questions:

1. What is the level of need for cognition do students have in their learning?.
2. Are there differences between students with high need for cognition and students with low need for cognition in meaningful cognitive engagement?.
3. Are there relationship between need for cognition and meaningful cognitive engagement among undergraduate students?.

**Methods**

**Participants**
Participants were 361 undergraduates enrolled in 8 courses which chosen randomly from all courses that taught in Hashemite University at second semester in academic year 2012/2013. Participants as a whole had a mean age of 20.2. They agreed to participate voluntarily.

**Instruments**
Need for cognition: Need for cognition was assessed via the short version (18 items) Need for Cognition Scale (Cacioppo, Petty & Kao, 1984). As was the case with other measures, items were rated on a 5- Likert scale (1= strongly disagree, 2= disagree, 3= neutral, 4= agree, and 5= strongly agree). The instrument has a reported Cronbach's alpha coefficients of .90. In the present study Cronbach's alpha reliability of the NFC scale was .86. Participants classified as high or low in need for cognition based on a median split (Mdn= 3.0). This led 215 participants to be categorized as high in need for cognition and 146 to be classified as low.

Meaningful cognitive engagement: Green and Miller's (1996) questionnaire measured cognitive engagement and contained 15 meaningful processing and 10 shallow processing items. Participants were asked to respond to each item using a 1 to 5 scale (1= strongly disagree, 2= disagree, 3= neutral, 4= agree, and 5= strongly agree). Only, 15 of the items are used to measure meaningful cognitive engagement. Green and Miller found a Cronbach's alpha of 0.90 for this version of the meaningful engagement subscale. In the current study, we reported consistency by Cronbach's alpha of 0.85 for this version of the meaningful engagement subscale.

**Procedures**
Data were collected in 8 separate classes. The measures were administered in paper format and were mostly completed in class. In class time, students were each given a booklet containing information about the research, the questionnaire and instructions, as well as assurances regarding the confidentiality of all data collected. They were given (20) minutes to complete the two scales.
Results

Results related to the current level of undergraduate students' need for cognition

Table 1 shows the descriptive analysis for the eighteen items of the Need for Cognition scale. The median 3.0 was used as the cut-off criterion to set aside high need for cognition students from low need for cognition students. The data shown in Table 1 revealed an overall mean score of 3.43; indicating high students' need for cognition. With regard to the 18 items of need for cognition, the highest mean score of need for cognition was 4.15 for item 2 "I like to have the responsibility of handing a situation that requires a lot of thinking". Whereas the lowest mean score of need for cognition was 2.25 for item 16 "I feel relief rather than satisfaction after completing a task that required a lot of mental effort".

Table 1: Means and Standard Deviations for Items of Need for Cognition

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Mean</th>
<th>SD</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I would prefer complex to simple problems</td>
<td>3.88</td>
<td>1.03</td>
<td>High</td>
</tr>
<tr>
<td>2</td>
<td>I like to have the responsibility of handing a situation that requires a lot of thinking</td>
<td>4.15</td>
<td>1.04</td>
<td>High</td>
</tr>
<tr>
<td>3</td>
<td>Thinking is not my idea of fun</td>
<td>3.85</td>
<td>1.02</td>
<td>High</td>
</tr>
<tr>
<td>4</td>
<td>I would rather do something that requires little thought than do something that is sure to challenge my thinking abilities</td>
<td>3.56</td>
<td>1.15</td>
<td>High</td>
</tr>
<tr>
<td>5</td>
<td>I try to anticipate and avoid situations where there is a likely chance I will have to think in-depth about something</td>
<td>3.77</td>
<td>1.20</td>
<td>High</td>
</tr>
<tr>
<td>6</td>
<td>I find satisfaction in deliberating hard and for long hours.</td>
<td>2.26</td>
<td>1.20</td>
<td>Low</td>
</tr>
<tr>
<td>7</td>
<td>I only think as hard as I have to.</td>
<td>2.65</td>
<td>1.21</td>
<td>Low</td>
</tr>
<tr>
<td>8</td>
<td>I prefer to think about small, daily projects to long-term ones.</td>
<td>3.49</td>
<td>1.24</td>
<td>High</td>
</tr>
<tr>
<td>9</td>
<td>I like tasks that require little thought once I’ve learned them.</td>
<td>2.66</td>
<td>1.16</td>
<td>Low</td>
</tr>
<tr>
<td>10</td>
<td>The idea of relying on thought to make my way to the top appeals to me.</td>
<td>2.81</td>
<td>1.09</td>
<td>Low</td>
</tr>
<tr>
<td>11</td>
<td>I really enjoy a task that involves coming up with new solutions to problems.</td>
<td>4.07</td>
<td>1.15</td>
<td>High</td>
</tr>
<tr>
<td>12</td>
<td>Learning new ways to think doesn’t excite me very much.</td>
<td>3.76</td>
<td>1.13</td>
<td>High</td>
</tr>
<tr>
<td>13</td>
<td>I prefer my life to be filled with puzzles that I must solve.</td>
<td>2.71</td>
<td>1.18</td>
<td>Low</td>
</tr>
<tr>
<td>14</td>
<td>The notion of thinking abstractly is appealing to me.</td>
<td>3.56</td>
<td>1.10</td>
<td>High</td>
</tr>
<tr>
<td>15</td>
<td>I would prefer a task that is intellectual, difficult, and important than a task that is somewhat important but doesn’t require much thought.</td>
<td>2.91</td>
<td>1.18</td>
<td>Low</td>
</tr>
<tr>
<td>16</td>
<td>I feel relief rather than satisfaction after completing a task that required a lot of mental effort.</td>
<td>2.25</td>
<td>1.23</td>
<td>Low</td>
</tr>
<tr>
<td>17</td>
<td>It’s enough for me that something gets the job done; I don’t care how or why it works.</td>
<td>3.44</td>
<td>1.08</td>
<td>High</td>
</tr>
<tr>
<td>18</td>
<td>I usually end up deliberating about issues even when they don’t affect me personally.</td>
<td>2.95</td>
<td>1.24</td>
<td>Low</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>3.43</td>
<td>1.07</td>
<td>High</td>
</tr>
</tbody>
</table>

Differences of meaningful cognitive engagement between students with high need for cognition and students with low need for cognition.

To examine differences between students with high need for cognition and students with low need for cognition in meaningful cognitive engagement, a t-test was utilized to determine if significant differences of students' meaningful cognitive engagement exist between students with high need for cognition and students with low need for cognition at participating Hashemite University.

T-test as shown Table 2 revealed that highly need for cognition students (n=215) reported higher meaningful engagement (M=3.45, SD=.34) than low need for cognition students (n=146, M=2.32, SD=.45). This difference was found to be statistically significant, t(df=349)=3.42, p ≤ .05.
Table 2: T-test, Means and Standard Deviations of Meaningful Cognitive Engagement of High and Low Need For Cognition Students.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
<th>T</th>
<th>Df</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>High need for cognition</td>
<td>3.45</td>
<td>.34</td>
<td>3.42</td>
<td>349</td>
<td>.002*</td>
</tr>
<tr>
<td>Low need for cognition</td>
<td>2.32</td>
<td>.45</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p ≤ 0.05

Relationship between need for cognition and meaningful cognitive engagement

As shown in table 3, findings showed a significant relation between meaningful cognitive engagement and need for cognition (r=0.35, p≤0.05). Specifically, high need for cognition was found to be significantly correlated with meaningful cognitive engagement (r=0.59, p≤0.05). Also, there was no significant difference between meaningful cognitive engagement and low need for cognition.

Table 3: The results of Pearson's correlation coefficient between students' meaningful cognitive engagement and need for cognition

<table>
<thead>
<tr>
<th>Variable</th>
<th>R</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>High need for cognition</td>
<td>.59*</td>
<td>0.00</td>
</tr>
<tr>
<td>Low need for cognition</td>
<td>.10</td>
<td>0.61</td>
</tr>
<tr>
<td>Total</td>
<td>.35*</td>
<td>0.002</td>
</tr>
</tbody>
</table>

*p ≤ 0.05

Discussion and Conclusions

The current findings provide evidence that students' differences in NFC determine the differences in meaningful cognitive engagement. That is, students who were relatively high in their NFC were more motivated to meaningful cognitive engagement. Students' high need for cognition are intrinsically motivated to learn; they choose strategies aimed at maximizing understanding by focusing on meaning, such as reading widely and integrating new learning with previous relevant knowledge. Students' low need for cognition is motivated to learn by factors that are external to the learning task; they didn't engage meaningfully and they have desire to obtain a qualification, and the fear of failure. In addition, the meaningful processors adopted more regulating strategies to organize learning and keep on track; they were more likely to make a study plan, keep up with the discussion, seek information to enhance their understanding, adjust their strategies to specific tasks and persist in the task. Students' high need for cognition to maintain students' concentration on learning are also important for students to engage in meaningful learning. Also, students' high need for cognition has a more complex knowledge structure, such as; relating the new information to one's existing knowledge, and try to understand the material thoroughly. Whereas, students' low need for cognition tend to use rote memorization, basic rehearsal, and other types of superficial engagement with the new material. This result consistent with Coutinho's (2006) study that noted that students' high need for cognition use more elaborative learning strategies.

On the other hand, need for cognition correlations with meaningful cognitive engagement. This correlation may be attributed to many reasons. For example, students with a high need for cognition tend to ask questions about the topic of learning, separate main issues from side issues and reflect on the material they have read; thus, tend to engage meaningfully. On the contrary, Students with a low need for cognition are less interested in effortful cognitive activities, focus on surface and rote learning; thus, tend to shallow engaged.

Also, students high in need for cognition spend more time and effort in intellectual activities, and therefore it is logical to assume that such students would engage more meaningful cognitive engagement. Because individuals high in NFC are curious and enjoy thinking, it might be assumed that
high-NFC students' process information presented in the media more thoroughly than those who don’t enjoy thinking as much. One approach for examining more extensive processing is through the storage of information. Students with higher NFC would be expected to store from memory more information than individuals with lower NFC because they are likely to have engaged in more extensive elaboration, thus increasing message availability in memory.

These findings are consistent with theoretical predictions (Evans, Kirby, & Fabrigar, 2003) that revealed that students employing meaningful approach, like those high in need for cognition, seek out information, think about it and reflect on it to make sense of the information and to make connections with prior knowledge. Students using the shallow approach, by contrast, focus on rote learning and other heuristics, in avoidance of elaborative processing.

Finally, previous literature indicates that need for cognition has initial role in cognitive engagement. Also, there is some evidence in support of the notion that ability to process increases with increasing NCF (See, Petty, & Evans, 2009). Thus, to the extent that a person is predisposed to expend effort in processing information in general, he or she will be more likely to meaningful cognitive engagement in learning.

References


