Bloom’s Taxonomy with Respect to Cognition in a Diverse Socio-Economic Classroom

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Abstract. The paper will look at the role of the socio economic influence in the transfer of knowledge and whether it can be used as a negative-positive stimulator in the meta-cognitive process. Through the diverse level of economic disparity that encompasses them we will look at the factors that go into a making a classroom a level playing environment for the diffusion of knowledge.

The paper will look at how experience can play a role in the creation of meta cognitive knowledge and the role of teachers as role models by sharing with students and amongst themselves as a pivotal feature in the establishment of positive meta cognitive experiences. The proposed structure would envisage creation of knowledge from ‘bottom-up’ through people via the teacher-student relationship with the entire focus on human-tacit knowledge creation and codification.

The scope of the paper is to:
1. Identify potential issues in making a classroom a level playing field for a diverse group of socio-economic students
2. Apply Bloom’s ‘revised’ Taxonomic table with respect to recall, understanding & applying of cognitive processes in the knowledge domain and the human infrastructure and tools required to implement this as a continuous process.

The paper will look at evaluating the problem through the framework provided by Bloom’s Taxonomy and analyze its relation through diverse socio economic influences in the classroom. The proposed solution will be based on the analysis of the taxonomic model as well as based on the results from our interviews.

The conclusions will provide a significant roadmap in the generation of knowledge through the classroom while attempting to minimize the impact of the socio-economic divides. In addition through the taxonomy we hope to provide knowledge transfer guidelines that will help in the sustainability of the knowledge cycle in the classroom.

Introduction

“Education must be considered a living process vibrant with life. It should integrate the person with his environment and give him a total perspective and a global outlook…. Education should be related to our environment” Surjit Singh Barnala, Governor of Tamil Nadu, India (23 November, 2005). [1]

Both students and staffs are equally susceptible to the pressures of a continuously changing world. Due to this, the pace and structure of education there are questions on relevance because of the steady pressure to produce results. The universal question of instruction is “How does one plan and deliver instruction that will result in high levels of learning for large numbers of students?” [2]

However it is unfair to ignore the socio economic differences in a classroom. While certain modules and levels of instruction require prior knowledge, it is important to look at the very creation of knowledge and facilitate a process to acquire it. There are no universal solutions or specific rules for responding to ethnic, gender, and cultural diversity in the classroom, and research on best practices is limited [3].

The paper take into account differing socio-economic levels as a means to cater to the students’ relation to and understanding of concepts with the aim of opening up new areas through their own
perspectives and provides a pathway from an alternative view. Socio-economic variables matter as different people come up with different experiences while relating to the same concept.

**Identifying Potential Issues in Making a Class Room a Level Playing Field**

The idea of initially teaching through relevant examples based on socio-economic groups had accusations of discriminatory overtones. On further discussions through the interviews there was a gradual understanding that we were looking not at specific instructional activities but at a broader educational framework.

Using the taxonomical (Bloom’s) approach helps increase effectiveness of the instruction but the teaching of students who come in from diverse socio-economic backgrounds may not always achieve the expected learning outcomes because of different cognitive experiences for the same concept.

It is important to emphasize that socio-economic variables may have little to do with an individual’s level of understanding which therefore raises the question ‘why look into socio-economic factors in the first place’? The answer lies partly in ones preference to process information differently given the same information.

Therefore if teaching is to be effective to a larger group of students then curriculum must be restructured to cater to the diversity (socio-economic) factors in class. Understanding how this can be achieved for a student who may feel the concepts too abstract is an important first step.

The factors have been divided into two categories: Program centric and Socio centric factors. Program centric factors include the criteria that may go into improving delivery (time, curriculum restructure, willingness etc.) and, Socio centric factors would include Family (income, classes’ etc), Individual (aptitude and attitude) and culture (race, religion).

**Program Centric Factors**

**Delivery.** Even though concepts may be well defined, trying to alter one’s explanation by adding explicit examples (through prior ascertaining of the socio-economic range) might prove to be challenging. The method of delivery, not the manner, will be physically and cognitively higher because of the new depth of examples required. In certain cultures, certain classes maybe still looked down upon even though abolished by law, and due to perceived improper implementation, given the sensitivities of the students involved, may end up slighting them, if the student ever makes it to class.

Another key factor, is the ability to teach the concept without being influenced by ones own prejudices. When explaining the concepts while teaching to a wide socio-economic range, this may calls for a restructuring and tinkering of ones own rationalities. While learning about teaching to a new variable one might be forced to unlearn what he has thought to be true all along.

**Curriculum Structure and Time.** Explicitly, another key factor involved is the re-structuring of the curriculum. While catering to the range of students’, additional effort and time will be involved after restructuring the content to fit into existing class schedules not to mention the deliberations required to cater to the new module content. A rethink in terms of the module and what is delivered right down to the class room will be required so that the process of change filters right down through to the students. This restructure may be part of a two-step process:

1. Re-evaluate scope of Module with respect to the new scale (Rethink with respect to time, content and diversity)
2. Implementation in Class (Rethink involving examples catering to diversity)

**Willingness.** The approach calls for a slightly different style wherein one ascertains diversity and plans for it accordingly. This means that the time taken in pre-preparation will become a bigger factor to be considered before the preparation for a class. With the additional time needed to ascertain diversity in the class, it is essential to obtain the teacher’s willingness to buy into this vision.
It is important to note that the objective of catering to socio-economic diversity was at loggerheads with the majority of teachers who participated in the survey, with most of them trying to emphasize that distinction in the methodology could not be influenced by socio-economic backgrounds.

**Socio-centric Factors**

Socio-centric factors here include both the factors that deal with the social and the economic aspect of a society. The reason for combining the two under Social-Centric is to facilitate the richness while construing the diversity. These factors are by far the hugely tacit criteria that go into making the classroom experience dynamic. While we will look at some of the factors involved, it is important to note the privacy and sensitivity of this information.

Some schools allow staffs access of this information although the factors collected may vary. What is necessary to be emphasized here is that there will be certain factors available to go into allowing for the socio-centric diversity to be assessed and should be used to ascertain the diversity present in class. Some of these factors may include the following: Family (income, classes’ etc), and culture (race, religion).

**Family.** Even though students come from differing socio-economic backgrounds, the characteristics of the family are in itself absolute. Although this point maybe highly controversial, it allows for the differentiation and determination of the background of the student. For example, if the student belongs to a highly dysfunctional family or to one at the other end of the spectrum, the fact remains that he is part of a unit that displays certain socio-economic characteristics.

The total income of the family may or may not give us an idea of literacy levels at home but the occupation of the parents can give us an idea of economic background of the student. This may help us understand what kind of examples would be better suited in class given the economic background. This in turn will relate to the students’ understanding the concept better through a relevant example.

Place of residence and number of members in the family can also result in useful tacit information which can be ascertained through the levels of income and/or can be determined during feedback sessions (open house, school activities etc) with the family. Through these interactions, sensitive information about a student can be passed on to a teacher if the family deems it important. This can help guide and fine tune the sensitivity to the diversity present in the class.

At this point, emphasis must be made to stress that these data are used solely for statistical purpose. Inferences may be drawn to assess the social structure in a class and checks and balances should be in place to prevent its misuse.

**Individual.** A student’s aptitude and attitude can contribute and determine his learning. While there might not be a direct socio-economic statistic, without the relevant study, that directly relates with the two A’s, it is again a tacit skill that teachers may need to look for while teaching a class. The relation is complex and is hard to define. But the key factor determining attitude is willingness and the key factor determining aptitude is hunger. Both may be required although there may be causal factor that allows for attitude to be the effect of a cause through which determination may then be a hunger.

Attitude is being able to go doggedly behind a concept in pursuit of what it conceals. Aptitude is having the ability to pursue a concept knowing what it will reveal. The experiences here of these students along with the others from varying different socio-economic backgrounds plotted along an imaginary spectrum can, at best, be implicitly understood enough to be accounted for. These qualities serve as stirringly motivating factors for a student to drive him and, the socio-economic range in his class may just be the key that stimulates one side of the spectrum.

**Teacher (Individual).** As an individual a teachers key role is his interaction and instruction with his class. The majority of teachers are paid less than their cohorts in the industry and using a staff background to ascertain his ability to explain concepts with examples related to a socio-economic stratum much higher or lower than him will call into some extrapolating empathy from the teacher.
It is important to look into staffs socio-economic status as well so that a better picture may be available of the teacher. This is to look at allowing no one to be considered superior or be allowed to determine the suitability to a class and it may be useful while setting up a structure with a global purpose of an Inclusive education system.

**Cultural Perspective.** Perhaps the most sensitive aspect of teaching today is knowing how to deal with the different cultures associated within a class. With various cultures and traditions forming a majority of the developing economies, a teacher must be aware of the sensitivities of language and examples that may influence the understanding of concepts positively or negatively.

Within culture, apart from tradition, ones community, race (ethnicity) and religion are potent forces to mingle with. While a majority of the staff from a local school may be aware of the cultural impact at the place where they teach, visiting staff from cities or other rural towns may need to be re-acclimatized to the traditions present in that particular area. It must be noted again that all these information are sensitive and maybe irrelevant in some societies.

A curriculum that is aware of the socio centric diversity in its class will cater for it whilst planning in its teaching. This curriculum that caters to the socio-diversity will become relevant pockets of information that can be better processed by a larger number of students. To paraphrase our discussion using a diagrammatic representation:

![Diagram](image)

Figure 1. To determine student centric information.

Thus Student Centric information can result from a reflective change in mindset from the teachers and a curriculum that recognizes the range of diversity along with the need to teach with it. If we look into the question of “how does one plan and deliver instruction that will result in a higher learning for a larger number of students” it is only natural that we look into and plan for the diversity present in the class in order to maximize learning.

The aim to deliver Student Centric Information and its influence in the development of knowledge for the student is to recognize the magnitude of the task. While being beneficial to students it also puts additional pressure on staff to deliver a wholesome program, in some cases having to relearn and, at times, unlearn.

The Socio-centric factors local to a region and the number of Teachers employed may have be looked into if through the revised Program centric curriculum, workload or the scope of the curriculum changes dramatically. This would put an additional burden on the school’s finances and negate the deployment in the first place. Once the curriculum has been redeveloped and the teaching methodology included for an Inclusive teaching method the information may be more easily digestible by the students.

In conclusion, a larger number of students will get access to information that they can process and relate to more easily. This will make learning for all a little bit easier because it is now understood by a larger number of students. These students may in turn then go on to help the weaker ones. Through this both the student who helps and the receiver will be influenced and engage with each other’s experience.

**Applying Bloom’s ‘Revised’ Taxonomic Table with Respect to Recall, Understanding & Applying of the Cognitive Processes in the Knowledge Domain; The Human Infrastructure and Tools Required to Implement this as a Continuous Process**

From a Student Centric curriculum, which arose from our discussions above, we will look at how the application of this will prove instrumental to association and eventually beneficial in Bloom’s Taxonomy of Meta-Cognitive knowledge.

While answering the second part of our question we take into consideration three key points while planning:
A. Assessing the range of diversity in a class
B. Influence the Cognitive experience through relevant examples as determined through the assessment.
C. Developing the Meta Cognitive effect in Bloom’s Taxonomy

**To Assess the Range of Diversity in Class**

Table 1. Assessing the range of diversity in a class.

<table>
<thead>
<tr>
<th>Social</th>
<th>Economic</th>
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<tbody>
<tr>
<td>Social Factors: ethnic, cultural, race, etc (relevant social and culturally acceptable information that could be gathered by the school)</td>
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<td>Economic Factors: current level of family income (may be used to plot standard of living, type of housing, place of residence etc)</td>
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</table>

Little diversity amongst the students in class which means that the transfer of knowledge using the instruction question may not require diversity in examples catering to range of socio-economic differences

Greater diversity amongst the students would mean that the transfer of information would be easier off if the example chosen factored in the diversity in class

**Influence the Cognitive Experience through Relevant Examples as Determined through the Assessment**

“… learners are not passive recipients of information, but that they actively construct their knowledge in interaction with the environment and through the reorganization of their mental structures..” [4]. Using the relevant examples taught in the class a larger number of students will be able to relate to the information. If we assume new concepts to be abstract data, then the examples which are used to explain these concepts can be contextualized through the relevant examples.

Simultaneously we are aware of the role of data and information in knowledge generation. Some of the cognitive processes of information generation from data would be context & category and when transforming this information to knowledge the processes would involve comparison, consequences, connections and conversations.

![Diagram](Note: The dividing lines between the three levels of processing information serve the purpose of a qualitative distinction of processing information only.)

Figure 2. Paraphrasing of knowledge generation.
The reason for the upward triangle having at its’ base ‘Student Centric Information’ is in the processing of the quantity of information. Once the relevant information has been sorted with respect to ones internal process, it gets condensed into Experiences. These Experiences through further sorting and processing become established pockets of knowledge which we relate to as facts. The tip of the triangle therefore accounts for this sort as what we eventually remember may be the fact and not always the source or the context behind it.

The implementation of the process in totality lies with the assessing of the socio-economic factors that go into defining the local society at that point in time. Once the range of the socio-economic diversity has been established, examples must be catered to suit the instruction question accordingly.

**Developing the Metacognitive effect in Bloom’s Taxonomy**

Metacognitive knowledge is “knowledge about cognition in general as well as awareness of and knowledge about one’s own cognition” [5]. The concepts explained through Student Centric Information allow for easier understanding, due to its relevance to the student. Since the eventual knowledge generation is based on the previous experiences of the user, it is suggested that in the Knowledge Dimension of Bloom’s Taxonomy, Metacognitive knowledge is generated as this is associated with and formed based on the students’ relation to his past experiences.

Learners are assumed to be active agents in their own learning; they select the information to which they will attend and construct their own meaning from this selected information. Bloom’s taxonomy has provided us with a comprehensive method of applying our teaching and learning skills. While we use the taxonomic classification to plan and assess students, it is an acknowledged fact that cognition does not work independently, rather it being a product of various circumstances.

<table>
<thead>
<tr>
<th>Knowledge Dimension</th>
<th>Remember</th>
<th>Understand</th>
<th>Apply</th>
<th>Analyze</th>
<th>Evaluate</th>
<th>Create</th>
</tr>
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<tbody>
<tr>
<td><strong>Factual</strong></td>
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<td><strong>Conceptual</strong></td>
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<td><strong>Procedural</strong></td>
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<tr>
<td><strong>Meta-Cognitive</strong></td>
<td>Student</td>
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<td>Examples</td>
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<td>eating to diversity</td>
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<td></td>
<td></td>
<td>Sharing the answers (results)</td>
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It is proposed that when instruction takes into consideration socio-economic factors it will be in keeping within its focus the relevance of its teaching through assessment in its acknowledgement of the socio-economic diversity. “It is difficult to assess Metacognitive knowledge using simple paper-and-pencil measures”. [6]

Through a survey conducted as well as through discussions, it was found to be ascertained that tutorials and/or practical lessons may be conducted to find out whether a student has understood his lesson. It is suggested then that lessons be designed that incorporate tutorials which obviously do not accept one standard answer due to the diversity of the class.

Metacognition is “not generic” [7] but instead is most effective when it is adapted to reflect the specific learning contexts of a specific topic, course, or discipline [8]. Through a survey conducted, a majority of staff also agreed that sharing answers in class will enable an affirmation of learning i.e. the student will believe that his experiences matter in the context of the lesson. In addition, it will be a useful strategy to generate Metacognitive knowledge,
as stated above, by associating alternative perspectives for the same concept. This may also in the long run affirm a belief in oneself that an individual context is unique and universally applicable. The student will thus find it easier to understand the impact of the information being taught in the class through this classroom process.

The Taxonomic Role in Knowledge Sharing Incorporates Two Stages

Affirming Student Experiences

When an example is related to a student who understands it based on his experiences, it affirms him as a person who is relevant in the context of learning. Thus his experiences and he come into play and the resulting answer he generates comes in from his perspective. Sharing this with other students affirms their experience through positive cognitive information. Here the experiences from their backgrounds are proven to be positive when their experiences have been interpreted through their answers.

Discussion of Answers

The discussion of student answers is a strategic way of generating Metacognitive information. It allows for students to be aware of similar strategies for addressing a concept, widens contextual knowledge and also allows for one to benchmark his knowledge levels with his peers. Sharing of answers of students works both ways through an inability to grasp another perspective of the same concept. Other factors that will also prove influential could be the aspiration factor that sets in, change in learning styles etc and how this may influence Metacognitive knowledge.

Results from a Survey and Factors that Affect Knowledge Sharing

A survey was conducted among teachers from an Institute of Higher Learning (tertiary) institution in Singapore. The objective was to ascertain whether student learning in class can be enhanced by the explanation of concepts with a range of examples to suit the students of different socio-economic backgrounds.

The Staff surveyed belonged to both who had been teaching in a developing economy, and staff from developed economies. In order to get a perspective of how the staff felt about the proposals put forward, the survey was conducted to ascertain the eventfulness should they be implemented.

A majority of the staff surveyed agreed on three major points:

1. Socio-economic backgrounds are relevant to learning and this influences the way the students are taught. As a result most staffs tend to use simple examples understandable by all students or vary the examples to suit the different people in class.

2. All staffs agreed that student learning can be affirmed through the sharing of a range of their students’ replies to their class tutorial/practical and through the sharing of the answers widen students’ horizon and that this will make the enabling of student learning easier..(Meta Cognitive knowledge generation)

3. All staff agreed that sharing student answers with colleagues would be useful to each other (Communities of Practice)

Factors Affecting Knowledge Sharing from the Teachers’ Point of View

Patronizing. On the teachers’ side, teaching while incorporating different examples includes the mental preparation both through reading and thinking through the examples and how they would affect the morale of the class should it come across as being patronizing.

Overcompensating. The survey results from teachers throw up a mixed bag of results when asked about ‘how many examples would be sufficient while teaching a concept’ with some of them opting for an end of the scale approach (extreme ends) and some looking at the illustrating examples based on the percentage of diversity. However the classes with a huge diversity may not allow for this to practically be possible. One suggestion was to teach limiting oneself to the lowest possible diversity variable.
Pre-requisite Knowledge. Certain subjects may require a basic knowledge/skill level for a particular course and this would, in some courses, play an important part as teachers may expect students to come into class with the relevant knowledge. While this may be true for certain advanced courses, the primary idea behind this reasoning is accepted.

Individual Inability. Teachers may not be equipped to handle different examples because of their inability to relate their concepts to different socio-economic themes. This may result in other forms of patronizing that may be looked into. Some staff maintained that empathy with students had more to do rather than the distribution of examples in class. While empathy is certainly welcome, grasping of the concepts is what will eventually provide them with a career for life.

Most of the teachers seemed aware of the various differences that existed within class although not all deemed it necessary to look into socio economic issues as a relevant red-flag to be catered too while preparing the to teach for higher order levels of learning for large numbers of students.

Framework for Teaching in a Diverse Socio-economic Classroom and its Effect on Meta Cognitive Knowledge with Bloom’s Taxonomy

Through an assessment of the diversity in class and by teaching with a Program Centric curriculum, the student will process the information given better and be able to initialize his cognitive experience to relate to what is being explained.

The method of applying the taxonomy in totality will fall into three stages:

a. Assessing the range of socio economic differences (Socio-Centric)
b. Teaching to incorporate examples with respect to the differences (Program Centric)
c. The Taxonomy and it’s role in Knowledge Sharing (meta cognitive knowledge)

We have discussed earlier the two parts namely the assessment of socio-economic diversity and the relevance of teaching to incorporate suitable examples through a Program centric curriculum.

Illustrated below is the framework suggested for the implementation of the taxonomy taking into account the Program Centric and Socio Centric changes which would give rise to Student Centric information.

Table 3. Framework for teaching in a diverse socio-economic classroom and its effect on meta cognitive knowledge with bloom’s taxonomy.

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Based on all the discussions so far the following recommendations may help in the setting up of the redesign:
**Recognize the Challenge.** It is a physical and demanding task to re-orient curriculum and then keep track of the teaching to suit the diversity. Curriculum diversity cannot be predicted down to a detail but acknowledgement and recognition of the diversity should be present in the teaching methodology along with a basic restructure is necessary if there is to be a worthwhile change.

**Share the Vision.** An Inclusive curriculum through Socio centric diversity taught via a Program centric curriculum. It is important to share this vision of Inclusive learning with the entire school to obtain awareness and allow for acceptance through a thorough discussion.

**Staff Buy-in.** Perhaps the biggest challenge. Even though the results of the survey have staff agreeing to share information this is easier said than done. Time constraints due to timetabling and the very act of sharing needs an environment that allows for sharing without repercussions of being right or wrong. Here again issues of various social issues amongst staff will set in and must be looked into.

**Allow and Recognize the Value of Communities of Practice.** Communities of Practice are groups of people who share a concern, a set of problems or a passion about a topic and who deepen their knowledge and expertise in this area by interacting on an ongoing basis. Allowing for informal chats to be part of the formal knowledge generation process may give eventually rise to a dual network of the double knit organization where knowledge will be spontaneously generated in a formal setting.

**Conclusion**

The effect of thinking about the issues of socio-economic diversity originally arose form the different methods lecturers processed information. This led on to thinking about how one’s socio-economic diversity molded a person’s thinking and this led us to receive and process information differently.

How does teaching differently help to enhance learning? It would be primarily in the assimilation of conceptual knowledge. Once this is understood and applied, along with examples and learning from the various discussions, one may begin not to see each others conditions as better or worse.

Education can help remove the various stigma attached to myths associated with stereo types. One can improve oneself through a sound education and make a living through the widening of his horizons.

The essay does not suggest unity of a socio-economic class as an ideal environment as it is against the very nature of the paper, however it does recognize that diversity allows for multitude of challenges and unforeseen obstacles. This framework while used for reference should be adapted and continuously adapted to suit ones requirement as the intention is to make classroom learning meaningful to a larger number of students. While this is not the only way forward, it takes into account possibilities that may ensure larger numbers of students are benefited.

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**References**


