A Study to Investigate Learning A Style That Has Higher Grade Achievement In Computer Programming

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ABSTRACT
Some students perform extremely excellent in some courses whiles they performance poorly in computer programming course in most of the Ghanaian higher institutions. The question is why some students perform excellent in some courses but these same students perform poorly in computer programming course.
In looking for ways of addressing this question the study seek to investigate whether some students with particular learning styles are likely to perform better than others. During the study the researcher compared the various learning styles and their corresponding grade achievement in computer programming by using Bonferroni Post Hoc Test on various learning styles and grade achievement. The study was conducted to find out correlation between students’ learning styles and their actual grade achievement of students studying computer programming.
In this study the research design that was employed was survey. The survey was used to find out the learning styles of the learners and their grade achievement in computer programming in the various institutions that formed the population of the research. Stratified Random Sampling Technique was employed for selecting the sample size. The students’ first two semesters’ results were used in order to find out the grade achievement. Data were analyzed by using, percentages, T -test, and one way ANOVA. After analysis it was found that Divergent learning style was learning style of majority of students of the institutions. The study found that there was a significant mean difference of learning styles in grade achievement of students studying computer programming. The divergent, assimilative, accommodative, and convergent learners acquired higher grades respectively. Therefore divergent learners have higher grade achievement in computer programming course.

KEYWORDS: Divergent, Convergent, Assimilative, Accomodative, Learning Styles, Computer Programming.

INTRODUCTION
When students are assessed on their performances some students always perform excellent in all the courses, some students perform poorly in almost all the courses and lastly, some students perform excellent in most of the courses whiles their performance in computer programming is extremely poor. The question is why some students perform excellent in some courses and fail to perform well in computer programming in most of the Ghanaian higher institutions? This study seeks to investigate into the various learning styles and their grade achievement. The study will compare the various learning styles and their grade achievement so as to come out with the learning style that is good for the study of computer programming course.
The main objective of the research reported in this paper is to find out the effect that the learning style has on learner's grade achievement in computer programming in order to help heads of department (HoD’s) in various institutions in Ghana during the course specialization of students. This study will help the Heads of department the kind of students that can specialized in computer programming.

LITERATURE REVIEW
The theory behind this research work was based on Kolb’s, Honey and Mumford learning style theories. Learning style can be defined as a condition or environment that a learner can learn best. In the literature, learning styles are often also referred to as "cognitive styles". James and Blank suggest the existence of difference dimensions within learning styles.

Kolb Learning Style Theory
Kolb (1984) theorized that four combinations of perceiving and processing determine four learning styles that make up a learning cycle. According to Kolb, the learning cycle involves four processes that must be present for learning to occur:
• Diverging (concrete, reflective) - Emphasizes the innovative and imaginative approach to doing things. Views concrete situations from many perspectives and adapts by observation rather than by action. Interested in people and tends to be feeling-oriented. Likes such activities as cooperative groups and brainstorming.
• Assimilating (abstract, reflective) - Pulls a number of different observations and thoughts into an integrated whole. Likes to reason inductively and create models and theories. Likes to design projects and experiments.

• Converging (abstract, active) - Emphasizes the practical application of ideas and solving problems. Likes decision-making, problem-solving, and the practicable application of ideas.

• Accommodating (concrete, active) - Uses trial and error rather than thought and reflection. Good at adapting to changing circumstances; solves problems in an intuitive, trial-and-error manner, such as discovery learning. Also tends to be at ease with people.

Kolb is the inspiration for a large numbers of theorists. For example, Honey and Mumford's model, Learning Styles Questionnaire (LSQ), is directly derived from Kolb's theory. Honey and Mumford (2000) note their debt to Kolb's theory; however, they also note that they produced their own Learning Styles Questionnaire (LSQ) because they found that Kolb's LSI had low face validity with managers. So rather than asking people directly how they learn, as Kolb's LSI does, Honey and Mumford gave them a questionnaire that probes general behavioral tendencies. Their reasoning is most people have never consciously considered how they really learn.

While basically the same as Kolb's model, there are a couple of differences. First, they substitute the terms “reflector” for divergers (reflective observation), “theorist” for assimilators (abstract conceptualization), “pragmatist” for convergers (concrete experience), and “activist” for accommodators (active experimentation). In addition, the new labels have slightly different meanings. They also postulate that people prefer different methods of learning, depending upon the situation and their experience level, thus they move between the four modes of learning, rather than being dominantly locked into one mode.

Honey and Mumford's learning cycle also slightly differs from Kolb's:

1. Having an experience
2. Reflecting on it
3. Drawing their own conclusions (theorizing)
4. Putting their theory into practice to see what happens

Based on the result, the learners can then move around the cycle again, jump in any part of the cycle, and then quit when they deem them self as successful (learned the task or material). Their model looks similar to this:
Fig 1-2: Honey and Mumford's Learning Styles Questionnaire

- **Reflector** - Prefers to learn from activities that allow them to watch, think, and review (time to think things over) what has happened. Likes to use journals and brainstorming. Lectures are helpful if they provide expert explanations and analysis.

- **Theorist** - Prefer to think problems through in a step-by-step manner. Likes lectures, analogies, systems, case studies, models, and readings. Talking with experts is normally not helpful.

- **Pragmatist** - Prefers to apply new learnings to actual practice to see if they work. Likes laboratories, field work, and observations. Likes feedback, coaching, and obvious links between the task-on-hand and a problem.

- **Activist** - Prefers the challenges of new experiences, involvement with others, assimilation and role-playing. Likes anything new, problem solving, and small group discussions.

**HYPOTHESIS**
With reference to the available literature on learning style theories the researcher considered the following hypothesis:

- **H1:** In terms of students performance there will be significant differences in the divergent learning style with convergent learning students

- **H2:** In terms of students performance there will be significant differences in the assimilative learning style with convergent learning students

- **H3:** In terms of students performance there will be significant differences in the convergent learning style students with assimilative, divergent and accommodative learning style students

- **H4:** In terms of students performance there will be significant differences in the accommodative learning style with convergent learning students

**METHODOLOGY**
This research study was carried out in order to find out the relationship between the learning styles and actual grade achievement of students and how this affects their cumulative results. An effort has also been made to find out what the learning styles of the students were and the learning resources given to the students by the instructors really address these learning styles of the students.

In this research learning style was taken as an independent variable, whereas grade achievement in only computer programming was taken as dependent variable. The study was carried out to find the effect of learning style on the actual grade achievement. Along with that the Effect of some extraneous variables on the learning style was also studied. These extraneous variables were gender and learning resources.

**Population**
Data for the study have been collected through a face-to-face interview with some students. A sample size of 820 students has been used in the study. This sample size has been chosen based on the ability to reach the lecturers at the university at time of the research.
Table 1 – 1
Sample size students obtained from universities

<table>
<thead>
<tr>
<th>S/No</th>
<th>Universities</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>University of education, winneba</td>
<td>462</td>
</tr>
<tr>
<td>2</td>
<td>Christian Service university</td>
<td>80</td>
</tr>
<tr>
<td>3</td>
<td>Baptist University</td>
<td>75</td>
</tr>
<tr>
<td>4</td>
<td>Catholic University college</td>
<td>86</td>
</tr>
<tr>
<td>5</td>
<td>Garden City university</td>
<td>117</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>820</td>
</tr>
</tbody>
</table>

**EMPIRICAL RESULTS**
During the analysis stage the researcher tried to find out whether some learning styles are better than others. In actual sense the researcher compared the various learning styles and their corresponding grade achievement. The following tables give the results of Bonferroni Post Hoc Test on various learning styles and grade achievement.

Table 1-2
Bonferroni Post Hoc Test for Mean difference of divergent learning style of the students and their Actual Grade Achievement with other learning styles

<table>
<thead>
<tr>
<th>(I) Learning Style</th>
<th>(J) Learning Styles</th>
<th>Mean Difference</th>
<th>Standard Error</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Divergent</td>
<td>Assimilative</td>
<td>0.116</td>
<td>0.087</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>Convergent</td>
<td>0.447</td>
<td>0.122</td>
<td>0.002</td>
</tr>
<tr>
<td></td>
<td>Accommodative</td>
<td>-0.011</td>
<td>0.124</td>
<td>1.000</td>
</tr>
</tbody>
</table>

The table 1-2 indicates that there is no significant mean difference between divergent learning style and both Assimilative (0.116) and Accommodative (-0.011) Learning styles at 0.05 level of significant. However, there is significant mean difference of (0.447) on convergent as to that of Divergent. It can therefore be concluded from the findings that divergent learners are better than convergent learners in relation to grade achievement.

Table 1-3
Bonferroni Post Hoc Test for Mean difference of Assimilative learning style of the students and their Actual Grade Achievement with other learning styles.

<table>
<thead>
<tr>
<th>(I) Learning Style</th>
<th>(J) Learning Styles</th>
<th>Mean Difference</th>
<th>Standard Error</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assimilative</td>
<td>Divergent</td>
<td>-0.116</td>
<td>0.087</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>Convergent</td>
<td>0.331</td>
<td>0.125</td>
<td>0.050</td>
</tr>
<tr>
<td></td>
<td>Accommodative</td>
<td>-0.126</td>
<td>0.127</td>
<td>1.000</td>
</tr>
</tbody>
</table>

The table 1-3 indicates that there is no significant mean difference between Assimilative learning style and both Divergent (-0.116) and Accommodative (-0.126) Learning styles at 0.05 level of significant. However, there is significant mean difference of (0.331) on Assimilative as to that of Convergent. It can therefore be concluded from the findings that Assimilative learners are better than convergent learners in relation to grade achievement.
Table 1-4
Bonferroni Post Hoc Test for Mean difference of Accommodative learning style of the students and their Actual Grade Achievement with other learning styles.

<table>
<thead>
<tr>
<th>(I) Learning Style</th>
<th>(J) Learning Styles</th>
<th>Mean Difference</th>
<th>Standard Error</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accommodative</td>
<td>Divergent</td>
<td>0.011</td>
<td>0.124</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>Assimilative</td>
<td>0.126</td>
<td>0.127</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>Convergent</td>
<td>0.458</td>
<td>0.153</td>
<td>0.017</td>
</tr>
</tbody>
</table>

The table 1-4 indicates that there is no significant mean difference between Accommodative learning style and both Assimilative (0.126) and Divergent (0.011) Learning styles at 0.05 level of significant. However, there is significant mean difference of (0.458) on convergent as to that of Accommodative. It can therefore be concluded from the findings that Accommodative learners are better than convergent learners in relation to grade achievement.

Table 1-5
Bonferroni Post Hoc Test for Mean difference of Convergent learning style of the students and their Actual Grade Achievement with other learning styles.

<table>
<thead>
<tr>
<th>(I) Learning Style</th>
<th>(J) Learning Styles</th>
<th>Mean Difference</th>
<th>Standard Error</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convergent</td>
<td>Divergent</td>
<td>-0.447</td>
<td>0.122</td>
<td>0.002</td>
</tr>
<tr>
<td></td>
<td>Assimilative</td>
<td>-0.331</td>
<td>0.125</td>
<td>0.050</td>
</tr>
<tr>
<td></td>
<td>Convergent</td>
<td>-0.458</td>
<td>0.153</td>
<td>0.017</td>
</tr>
</tbody>
</table>

Table 1-5 indicates that there is significant mean difference between convergent learning style and all the other learning styles: Divergent is (-0.447), Accommodative is (-0.458) and Assimilative is (-0.331) at 0.05 level of significant. It can therefore be concluded from the findings that Assimilative, Divergent and Accommodative learners are better than convergent learners in relation to grade achievement.

CONCLUSION
The study seeks to find evidence that some learning styles are better than others in relation to grade achievement of the learner. A significant mean difference was found between students’ learning styles and their actual grade achievement. The study shows that there is significant mean difference of (0.447) on convergent as to that of Divergent. It can therefore be concluded from the findings that divergent learners are better than convergent learners in relation to grade achievement.

Again, there is significant mean difference of (0.331) on Assimilative as to that of Convergent. It can therefore be concluded from the findings that Assimilative learners are better than convergent learners in relation to grade achievement.

Moreover, there is significant mean difference of (0.458) on convergent as to that of Accommodative. It can therefore be concluded from the findings that Accommodative learners are better than convergent learners in relation to grade achievement.

Finally, the divergent learning style learners are better than other like assimilating, accommodating learning styles respectively. It was also found out that convergent learners benefited less in terms of grades.

REFERENCES