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Co relations between cognitive beliefs and dominance in brain hemisphericity of first year engineering students.

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Abstract

In the past quarter of a century considerable attention has been given to what is called as brain hemisphericity. These early brain researchers found that the two halves of brain i.e. right and left hemisphere process information differently but there can be exchange of information. Both the hemispheres are equally important, but most of the time it was found that the one of the hemisphere is dominated over the other. These neurosurgeons findings had direct implications in teaching and learning process.

The HDT test is established test used for finding the dominance of a hemisphere of a learner which is objective type test consists of 50questions with each two responses.

MPEX test is actually measuring the development of cognitive beliefs or what is called as Physics expectancy test. There are six domains and from test made up of 34 objective type questions one can measure the whether the cognitive belief is expert like or Novice like.

In this research paper we found co relations between hemisphere dominance with cognitive beliefs of engineering students studying in 10+2+4 pattern in University of Mumbai, India.

OBJECTIVES:

Every survey intends to find relations in quantifying form so that some new correlations or findings can be derived from it. In this survey the students from engineering from college Yadavrao Tasgaonkar institute of engineering and technology, filled three types of forms. Firstly the basic information form, secondly the Hemisphere dominance test (HDT), which is objective type test with two options and lastly MPEX test on physics expectancies, developed by Department of Physics, Maryland University. Maryland physics education group: http://www.physics.umd.edu/perg

FROM THESE OBSERVATIONS FOLLOWING OBJECTIVES WERE SET:

1)To measure the cognitive beliefs that is Physics expectancies and hemisphere dominance in the engineering students using established tests.
2)To find co relations between hemisphere dominance and cognitive beliefs amongst students.
3)To find gender effect on hemisphere dominance.
4)To find co relations between hemisphere dominance and cognitive beliefs amongst male students.

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METHODOLOGY AND TOOLS USED:
This was survey and co relational type of research.
(i)The information like entry level performance, gender, language of instruction up to entry level (that is up to 12th standard), knowledge of computers etc was obtained from basic information form, filled by the students.
(ii)From MPEX (Maryland Physics Expectancies) survey student's cognitive beliefs in physics were quantified.

MPEX test tool:
http://www.physics.umd.edu/rgroups/ripe/perg/experts/mpex.htm The development of student's cognitive domains like, Independence, Coherence, Reality link, Mathematics link, ability and interest in taking efforts, were quantified.

The student's attempted these tests of 34 questions with five responses varying from strongly disagree to strongly agree scale, and students required to select any one appropriate response. The responses were arranged as Lickert scale. The questions were then clustered in to six interdependent groups or domains or beliefs.

IT WAS A SET OF 34 QUESTIONS, TESTING FOLLOWING SIX COGNITIVE BELIEFS IN PHYSICS:
D1: Independence. (Beliefs about learning physics- Whether it means receiving information or involves an active process of reconstructing one's own understanding).
D2: Coherence. (Beliefs about the structure of physics knowledge- As a collection of isolated pieces, or as a single coherent system)
D3: Concepts. (Beliefs about the content of physics knowledge- As formulas or as concepts that underlie the formulas)
D4: Reality link. (Beliefs about the connection between physics and reality- Whether physics is related to experiences outside the classroom or whether it is useful to think them together)
D5: Mathematics link. (Beliefs about the role of mathematics in learning physics- Whether the mathematical formulation is just to calculate numbers or is used as a way of representing information about physical phenomena)
D6: Effort. (Beliefs about the kind of activities and type of work necessary to make sense out of physics- Whether they expects to think carefully and evaluate what they are doing based on available materials and feedback or not.)

From clusters or domains, one can extract whether their answers were favorable or unfavorable for particular domain that is for a particular cognitive belief, in reference to responses given by experts. One can gauge whether current status of students are more towards experts or towards novice like. It can be clearly seen that which particular domain was unfavorable and how much. Accordingly it is possible to suggest particular remedy in the novice like belief.

(iii)HDT: Hemisphere Dominance test: this is established test comprised of 50 questions with two options. A option indicates right hemisphere dominance, B option indicates left hemisphere dominance while selecting both options indicates the integrated hemisphere that is a person is using both hemisphere with equal intensity. It is very important to know the overall distribution of hemisphere dominance amongst students for designing task of teaching and learning. But one should note that both the hemisphere are involved in thinking, logic and reasoning and in creation and appreciation of art.

Following are the variables which were considered for finding co relations:
D1: Independence.**D2:** coherence.**D3:** concepts.**D4:** reality link.**D5:** mathematics link.
D6: Effort. Gender: F/M. HDT: hemisphere dominance test.
A: Dominance of Right hemisphere, B: Dominance of left Hemisphere, C= A+B: Dominance of Integrated hemisphere.

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SELECTION OF SAMPLE:

The engineering students were selected from first year (Second semester) of Yadavrao Tasgaonkar institute of engineering and technology, karjat, India.

In all 51 students were observed. Male students=37 and female students=14.

To display results of MPEX test in a concise and easily interpretable manner, plot may be introduced. In this plot, the percentage of respondents in each group, answering favorably, were plotted against the percentage of respondents in each group answering unfavorably. Since the fraction of students agreeing and disagreeing must add up to less than or equal to 100%, all points must lie in the triangle bounded by the corners (0, 0), (0,100), (100, 0). The distance from the diagonal line is a measure of the number of respondents who answered neutral or chose not to answer. The closer a point is to the upper left corner of the allowed region, the better the group's agreement with the expert response.

It was given in the test that if students showed 80% or above favorable response then that domain is consider to be Expert like else it is to be consider Novice like.

ANALYSIS OF RESPONSE:

Consider the response of total 51 students of boys and girls, and also response of 37 male students.

THE VALUES ARE GIVEN IN PERCENTAGE ONLY.

Type of group	HDT response	Type of response for MPEX:	D1	D2	D3	D4	D5	D6
Mix group	A=78.4 B=15.6 C= 6	F	39.2	9.8	9.8	49	31.3	68.6
		U	43.1	74.5	76.4	29.4	52.9	15.6
Male students	A=78.4 B=18.9 C=2.7	F	40.5	10.8	5.4	51.3	37.8	62.2
		U	37.8	72.9	81	27	48.6	18.9

MAIN FINDINGS:

FOLLOWING ARE THE FINDINGS:

1)All the domains are Novice like that is undeveloped for a group of mix students as well as for a group of male students. The domains D2 and D3 were highly undeveloped; these are representing Coherence and Concept respectively. While domain D6 the effort domain is more developed and is near expert like.

2)Dominance of right brain is observed to be 78.4% for mix group and for male students. While for girl students also right hemisphere dominates with dominance of 78.5%.

This indicates that most of the students relay on visual spatial things, spontaneous intuitive. These students are not good in sequential steps, and are not having rational and analytical approach that is theses students are less theoretical.

Present teaching and learning emphasizes and favors left brain learning over right brain learning. Because listening to lectures and relying on text or reference books, following sequential steps in practical supports only left brain activity.

As a result of which students dominated by right hemisphere could not comprehend such activities effectively and as a result of which there cognitive beliefs remains undeveloped.

3)Since right brain dominance is very high such technical subjects which need analytical thinking and rational approach cannot be perceived properly by students and so the domains like Coherence and Concept remains highly Novice like.

4)Both male and female students showed right hemisphere dominance and similar cognitive belief development.

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5)It is important to know that both the hemispheres are equally important. It was found from work done in artificial intelligence that when a person exposed to new phenomenon first thing that occurs is that person give preliminary value to it as Is it interesting or not? If the answer is yes then that information is given to right hemisphere to form a holistic sense and that information is given to left brain to deal with analytically. Thus it is very important to create interest in science teaching as we are dealing with a group which is dominated by right hemisphere.

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