

The importance of learning styles in academic and applied settings

to:

Comparison of learning strategies in successful and unsuccessful students

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In this review of "*Comparison of learning strategies in successful and unsuccessful students*" I provide context to the research. I hope that this will lead to more studies on learning strategies which are useful in schools and in different applied settings, for example, patients who need to learn about an illness and multiple treatment options, or individuals in the U.S.A. who need to choose from among many different drug coverage plans. When it is clear how different areas are learned best, this can be pointed out with the materials to be learned.

I will comment first on the content and then on the presentation. The results in "*Comparison of learning strategies...*" are very clear about what works best for third year female high school students in Tehran, and the results make sense considering what needs to be learned in these specific areas at this stage of education. Thus the results probably are applicable across the world and with both genders. Successful students were more likely than unsuccessful students to engage in Monitoring of their Comprehension, and this was true in each of the areas studied, namely Mathematics (which included physics), Experimental Sciences (which included biology and chemistry) and Humanities (which included sociology and history). Successful students were not more likely to use Rehearsal in any of these areas. Beyond this, in Mathematics and the Humanities, successful students were more likely than unsuccessful student to look for applications and restate material in their own words (Elaboration), whereas in biology and chemistry, successful students were more likely to Organize the material to be learned.

The level at which learning styles were examined, that is, as study skills, is a good one. Exploring skills used in school at an even more basic level of sense modality preference on the part of students without sensory problems did not predict learning [1]. Similarly, analysis at the level of the personality frequently leads to nonsignificant results [2, 3]. However, personality, like culture, influences the level of interest in different areas and the motivation to apply the study skills ("*Comparison of learning strategies...*" [4, 5]), as well as perhaps the perceived appropriateness of the area of study by particular students.

There may be other variables which influence which study skills work best. The students in this study, "*Comparison of learning strategies...*",

benefited more from Organization than Elaboration in chemistry and biology. Perhaps more advanced students and professionals in these areas know the structure of the areas well enough that Elaboration becomes more important. Similarly what needs to be learned may help determine study skills; for example, questioning becomes more important when higher levels of cognitive knowledge are demanded of the person [6].

Other study skills at this level of analysis also deserve further exploration. Sometimes teaching the material to peers helps make the knowledge both clearer and more memorable [7]. Other researchers have explored associated study skills, and these are worth examining [8]. For example, Schmeck [9] explored Deep Processing which consisted of looking for relationships between ideas and an abstract level of comprehension.

Applications to nonacademic domains need to be examined. For example, Elaboration, but not Deep Processing, was used in planning for end-of-life events, but both Elaboration and Deep Processing were used to understand other real life issues, such as marriage and goals in life [10]. This type of exploration of study skills can be extended readily to other areas, and there are good reasons to do so. For example, how do family members best learn about a disease which a patient has, treatment options, and lifestyle changes?

With respect to the presentation of the results of the study, once differences are found, an average may no longer be the best representation of the results. In *"Comparison of learning strategies..."*, average best strategies are presented in Table II and stated in the Discussion, but these are misleading. In each of the major areas, only Comprehension Monitoring was used more frequently by successful students than by unsuccessful students, whereas there was no difference in the frequency of use of Rehearsal. There were clear differences by area in whether successful students were more likely to use Organization or Elaboration to master the materials. Once clear differences are found, these must be accepted and respected.

I was asked to edit the presentation after volunteering to do so. Most of this editing made no difference in the comprehensibility of the paper. It consisted of adding the unpredictable vagaries of linguistic habits, e.g., students are "in" their third year "of" school, rather than "of" their third year "in" school. I have no idea why this is so. Languages depend to a great degree on what has become habit. Beyond this I made only two substantive changes. As Watala [11] indicated, and as I have experienced, it is important that variables are clearly defined and that ideas should be iterative. With respect to this paper, this means that defining carefully the different strategies studied, giving them a label, capitalizing this label, and then

continuing to use this capitalized label as the referent makes it easier to read the paper. Sometimes, e.g., in the Results section, the learning strategy was described but not named, and this led to having to stop to make sure which learning style was meant by carefully examining the context of the writing. I also recommend giving examples of the questions asked for each learning style; the questions help communicate what the learning style (study skill) is about. This can be done in the Method section when the surveys used in the study are introduced and explained. The second change was in the tables. When probabilities for a t-statistic are indicated in a row in a table, a subscript with the significance level rounded off is redundant and distracting. Also, it is possible (as in Table I) to label rows at the front, so that it is not necessary to repeat the symbol with each number, in this case %, and doing so makes reading the numbers easier. Lastly, I would strongly urge that a paper be proofread by people not involved in the study to check for clarity. After working hard on a study and write up, it is difficult to know what may be unclear to individuals not involved in the study. In fact, after reading a paper a great number of times, it may not be completely clear whether the reader is actually reading or recalling the information. Further, when the writing is in a foreign language, it helps to have someone very familiar with this language proofread it to avoid miscommunication.

I very sincerely hope that we soon will have more research and knowledge about learning styles (study skills) which work best both in academic and nonacademic areas and settings. *"Comparison of learning strategies..."* is an excellent step on the road toward this knowledge.

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