

The development of the information processing model (Johnstone, 1997) brought some radical changes to address students' understanding difficulties in mathematics and science subjects. The model mainly concerned the ways the learner process the incoming information and better results were reported in different contexts. In this study cognitive improvement of the secondary level students in the subject of mathematics was explored.

It mainly concerned the prediction of the model "if working memory is overloaded then there is a sudden drop in students' performance". To reduce the working memory overload, the concentration was diverted to the other predictions of the model. These predictions of the model lead towards the idea of pre-learning.

To check the effectiveness of this strategy a sample of 212 students from two schools in Cantt/Garrison setup Peshawar Pakistan was selected. The sample was divided into with and without pre-lecture groups. To judge the difference between the performances of the two groups objectively, it was necessary to assess the students' attitude towards mathematics. For this purpose an attitude questionnaire was administered on the sample at the preliminary stage of the implementation of experimental plan. To check the reliability of the tool internal consistency method was used. After employing chi-square test, the attitude questionnaire was found reliable. At the final stage by using chi-square test no significant difference was found between the overall positive attitudes of the two groups.

The experimental group got treatment through pre-lecture (information processing model) whereas the control group through traditional teaching method for the academic session 2011-12. The students of former group performed significantly better in all categories than the students of later group. To ensure the objectivity of the post-test results through external source Federal Board results (2012) of the two groups were also analyzed. By employing t-test as whole significant difference was observed between the mean scores as the students of the former group performed significantly better than the students of the latter group.

It was found that by using pre-lecture strategy aided to understanding and procedural learning of both boys and girls in mathematics. As whole the girls outperformed the boys in all groups, but no significant difference was observed between post-test performance of the girls and boys with pre-lecture. This shows that the pre-lecture might have an effect of supporting boys' understanding more than the girls. It was found that the girls got more improvement in procedural learning as compared to boys, this shows gender bias in quality of teaching in favor of boys. This study also depicted that as whole the teaching learning process got improved in the subject of mathematics at secondary level.

In Pakistan procedural learning is widely rewarded in teaching learning process of mathematics at all levels, therefore this study in replica form can be extended to other levels as well. The Board Examinations are mainly measure learning at lower cognitive levels such as procedure and recall

therefore this issue needs to be addressed by the relevant department in future. The mathematics' textbooks materials need redesigning keeping in view the working memory capacities of the learners. Equal opportunities should be provided to the girls in par with boys in the context of quality of teaching in Pakistan.

There is a vast contrast between procedural achievement and understanding in mathematics, therefore this issue needs more explorations. In this study due to high standard deviation values in certain categories, all the students couldn't equally benefitted from the treatment given to the experimental group. In future, more work is needed to explore this in special connection to the learner's interests and capabilities. Working memory plays an important role in understanding therefore this area needs more exploration in special relation to learning mathematics. Exploration must be made to assess students' attitudes change to real understanding in mathematics.