

# ENHANCING THE LEARNING EXPERIENCE BY ADDRESSING THE NEEDS OF THE LEARNER THROUGH CUSTOMIZATION AND PERSONALIZATION IN THE LEARNING BY DOING METHODOLOGY

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**Abstract**— Individuals differ in their abilities to learn new concepts. However, traditional learning paradigms treat all individuals alike and standardize learning materials and delivery systems. We have observed that customized learning environments in the learning by doing mode enhance the learning experience better than standardized learning environments. The preliminary results of our research based on training 155 faculty members from 36 engineering colleges are encouraging and point to the potential benefits of multiple levels of personalization and customization which we have explored.

**Keywords**- *learning by doing, customization, personalization, enhanced learning*

## I. INTRODUCTION

India produces about 500,000 engineering graduates every year. But, only about 25% of these engineering graduates are employable [1]. The number of quality faculty being non-commensurate with the number of engineering colleges is another matter of concern [2].

To address the quality of faculty members at engineering colleges, we conducted a teacher training program for 155 faculty members from 36 engineering colleges. The course design and delivery for this training program was done in the learning-by-doing (LBD) instructional model instead of the lecture model because this training program was more focused on combining theoretical knowledge with its application (problem-centric approach) [3][4]. These trained teachers were expected to teach the same course content at their respective colleges to their students.

While LBD methodology has existed, we have combined that with personalization and customization with effective results. In addition, we have explored multiple iterations of customization.

## II. THE APPROACH

We divided the 155 faculty members in two batches of 48 and 107 members respectively (refer Table 1). Each batch of faculty members worked independent of the other and was trained on Linux, Data structures using Java, Soft skills and productivity skills and Computational Thinking (this course was designed to give an introduction to logic and programming for faculty members from a non-programming background through the use of the RAPTOR tool [5]) [6].

To assess whether customization of course content was more effective than the learning by doing content with a group model, we offered neither customization nor personalization for the first batch and offered both customization and personalization for the second batch [7][8]. We also contrasted a group learning model with a personalized learning model in achieving the objectives of the training program.

Before commencing the training, we assessed both the batches on their knowledge in programming skills. Additionally, we categorized the second batch faculty members into “beginner”, “intermediate” and “expert” levels based on his/her individual scores in the initial survey. We included personalization by having mentors assist these faculty members in the course. Each mentor was assigned a group of 10 faculty members and he/she was responsible for interacting and guiding them.

Based on the knowledge level of the faculty member and his/her learning rate (observed by mentors through personal interaction), we customized the content for the second batch by including “toy problems” for each concept taught. These toy problems designed by the mentors were condensed versions of bigger problems.

Additionally, each mentor was responsible for designing the “custom plan” for each faculty member. This “custom plan” (which was unique for each faculty member) included customizations like the number of toy problems to be done and the schedule for each module. Another level of customization was done as we observed that several faculty members were advancing faster than their custom plans indicated.

The process of personalization and customization is shown in figure 1. The agent in figure 1 can be treated as the team of mentors that did the customization.

TABLE I. COMPARISON OF THE TWO TRAINING BATCHES

		<i>First batch (48)</i>	<i>Second batch (107)</i>
Teaching Experience	0-5 years	44	84
	5+ years	4	23
Teaching background	Computer science	40	102
	Non-Computer science	8	5

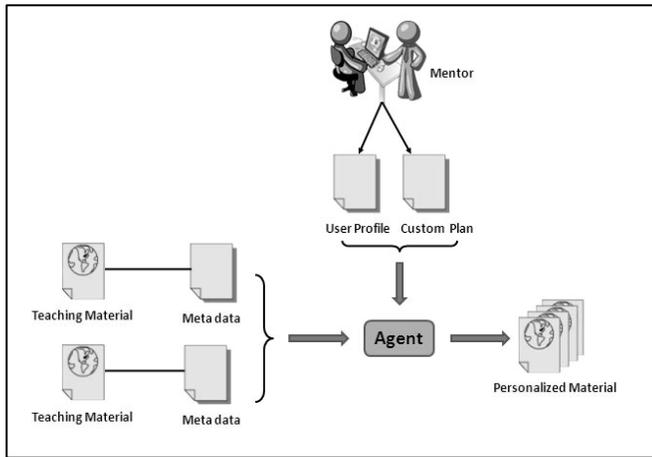


FIGURE 1. PROCESS OF PERSONALIZATION AND CUSTOMIZATION

### III. RESULTS

After the training was completed, the faculty members were assessed on the same set of questions independently. To ensure fair assessment of the faculty members, mentors were not involved during the preparation of questions and also during the evaluation process. We have based our research on an analysis of the scores obtained by the faculty members before and after training and measured the faculty members from the two batches on various parameters like level of satisfaction with learning experience, time taken to complete training and skills level gain. We have described below our observations and results of the tests conducted.

**Skills level gain:** As can be seen from figure 2, the mean skill score for the first batch was 6.5 while for the second batch it was 7.2. These scores are indicative of a general improvement in both groups. It can be observed that the improvement in the first batch was only 0.9 points (16.07%), while for the second batch, the improvement was 1.5 points (26.32%). When the faculty members from both the batches were compared (before the training), the difference in their scores turned out to be not significant. Performing a t-test, we got a “p-value” of 0.1826. But when we compared the scores of both the batches (after training), we got a “p-value” of 0.005, which is significant.

**Satisfaction with learning experience:** Providing the second batch with personalization increased their confidence levels and in turn, their performance and satisfaction. Members of the second batch indicated their eagerness to implement the program in their respective colleges; a similar response was not received from the first batch. Presently, faculty members from 10 engineering colleges (9 from second batch and 1 from first batch) have taken the initiative and implemented this training program at their colleges.

**Time to learn:** The faculty members of the first batch took a little more than 4 months while members from the second batch took less than 3 months to complete the training. Iterative customization led to faster learning and personalization led to satisfaction with the learning experience. Both these factors resulted in a reduced time to learn for the second batch faculty members.

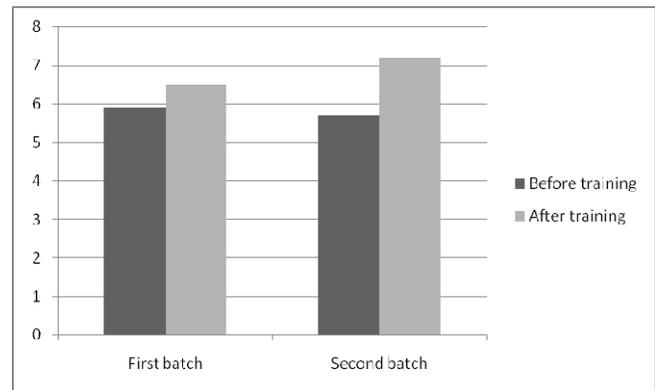


FIGURE 2. SCORES OF FACULTY MEMBERS OF BOTH BATCHES BEFORE AND AFTER TRAINING

### IV. FUTURE WORK

Our future work would be to carry out similar research on the engineering college students enrolled for our course at the 10 implementing college students and we would like to extend this work to the set of 12000+ engineering college students who would be taking our course in the next three years.

Further, we would like to ascertain the levels of retention and application of the knowledge in both the groups. For this we propose to assess the two groups on a periodic basis and understand the benefits of customization in the long run.

Additionally, we are interested in applying iterative customization and observe the knowledge gain of the learners.

### V. CONCLUSION

Since learning capabilities differ between people, we attempted to assess the benefits of customizing learning experiences for people based on their skill levels. Our preliminary results show promise; people who experienced customized instruction learned their information faster (second batch faculty members took 25% less time to complete the training), showed greater improvement in their skill levels, and expressed greater satisfaction with the learning experience than those who were exposed to a learning experience without any customization.

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