The Greenfield Coalition Learning Factory

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In manufacturing engineering education, it is evident that traditional lecture-style classes do not effectively promote transfer, retention and application of concepts learned in the classroom. Students are not able to solve problems from real situations in authentic manufacturing situations. Therefore, a need exists for the reflection of problem-solving similar to the real world embedded in the teaching and learning of key concepts.

The Greenfield Coalition (GC), located at the Focus: HOPE Center for Advanced Technologies (CAT), a tier one supplier to the automotive industry, has responded to this need by offering three manufacturing engineering degrees that blend real world situations with traditional academic studies to create an environment rich with learning experiences. At GC, candidates enrolled in one of the degree programs have the opportunity to apply concepts, skills, and techniques learned in the classroom to problems on the shop floor on a daily basis. As a result, they are able to make more connections between their own prior knowledge and experiences and the new information. The significance of learning certain topics becomes more intuitive to the learners as a result of using it in a natural context – the manufacturing facility. We refer to this environment as “The Learning Factory” for manufacturing engineers similar to learning hospitals for physicians.

The design of course materials is predicated on the set of beliefs listed below.

- Learning is a shared responsibility between learner and teacher.
- Faculty play a key role guiding students in the learning process.
- Learning is made real if it is integrated with real world experiences.
- Learners must prepare to engage in classroom experiences.
- Learning is a social process, which requires interaction with mentors and peers.
- By actively participating in their learning, students achieve deeper understanding and enhanced skills.
- Technology is not a silver bullet, which by itself promotes learning, but if used effectively, it can provide new capabilities to support learning.

At GC, this is demonstrated by a blended learning approach, involving the integration of instructor-facilitated classroom activities, sharing of manufacturing experiences of the candidates at the CAT, bestowing course credit for experiences on the shop floor, and utilizing the web-enabled technology wherever possible in order to enhance manufacturing engineering education. The result is a very fulfilling learning experience that includes learner collaboration, learner support, and innovation.
In order to produce an instructionally-sound, technically-supported, engaging course or case, a team of subject matter experts from academia and industry collaborate with an instructional designer, a programmer and media specialist. The materials developed are inclusive of key manufacturing engineering concepts and directly applicable to real-world, on-the-job experiences. Often these materials include templates, tools and step-by-step instructions used by practicing engineers.

Using Gagne’s Nine External Events of Instruction as a guide, GC is able to maximize the motivation for learning, add relevance to the content and foster an active learning atmosphere. At the commencement of a course, students are posed with a situation or set of questions to stimulate and engage thought processing regarding the concept at hand. These situations and questions relate to real-world problems that do not have one discreet answer. Rather, there are many potential solutions with differing costs and benefits. The learning activities that follow encourage learners to do their own investigations, challenge typical solutions, and practice the skills and techniques that will be necessary on the job. This is exemplified in case studies where learners are challenged to determine the scope of the problem, how it can be solved, and what materials – textbook, Internet, instructor, knowledge and experience of peers – will be essential for completing the activity.

Tools for replicating this methodology of designing a blended learning approach as well as display and demonstration of the courses and cases developed thus far will occur during this poster session. It is hoped that feedback will help GC identify ways to make the adoption and implementation of collaborative, problem-solving and experiential learning easier and hence, more popular.

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