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# Online Education for the Student Professional

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## ABSTRACT

This proposal outlines the application of the theory of constraints (TOC) to serving the working professionals in the industrial technology (IT) programs at the University of Texas of the Permian Basin (UTPB). Bottlenecks in the process are identified. Changes are then proposed in the delivery of the program to maximize throughput, as it applies to the number of students in the IT programes.

### 1. INTRODUCTION

This project will apply Goldratt's Theory of Constraints (TOC) to serve the working professionals in the technology courses at UTPB. In education we have to increase enrollment in order to keep up with the increasing cost of education. The constraint in developing online courses is that it takes a lot of work to develop an online course. Finding ways to increase the number of online courses will help serve the working professionals and increase student enrollment and program enrollment.

### 2. OVERV EW AND BACKGROUND

In 2004, I was brought in to start up a new Industrial Technology program at UTPB. The curriculum is a combination of manufacturing, petroleum, and business coursework. The program was specifically designed to meet the needs of the manufacturing and petroleum industry in the Permian Basin of West Texas as one out of ten jobs in the area is related to manufacturing and exploration related to the petroleum industry. The courses were initially offered at night because we expected working people to be interested in this program.

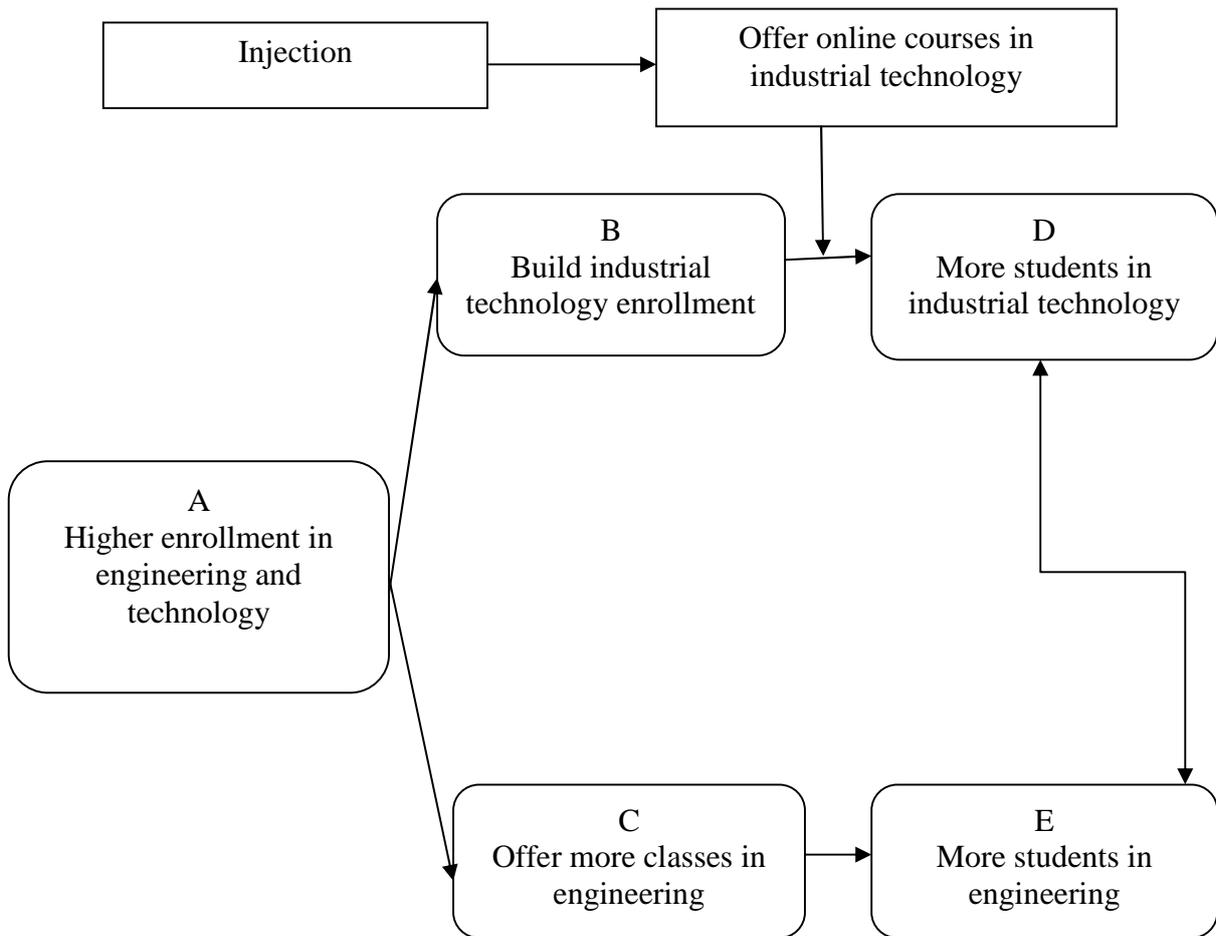
### 3. PROJECT PLAN

In Goldratt's Theory of Constraints<sup>1</sup> (TOC), a given group of processes will have a weakest link and the weakest link controls the entire systems production rate. In order to maximize the system production, the weakest link must be improved and all other links in the processes regulated to the speed of the weakest link. According to Goldratt<sup>2</sup> the first step in the Thinking Process is to develop a list of at least 10 – 12 undesirable effects (UDE) that currently apply to the problem at hand. It is helpful to write the current state in a diagram format. This diagram shows a logical explanation of the situation (Figure 1 – Current Reality Tree).

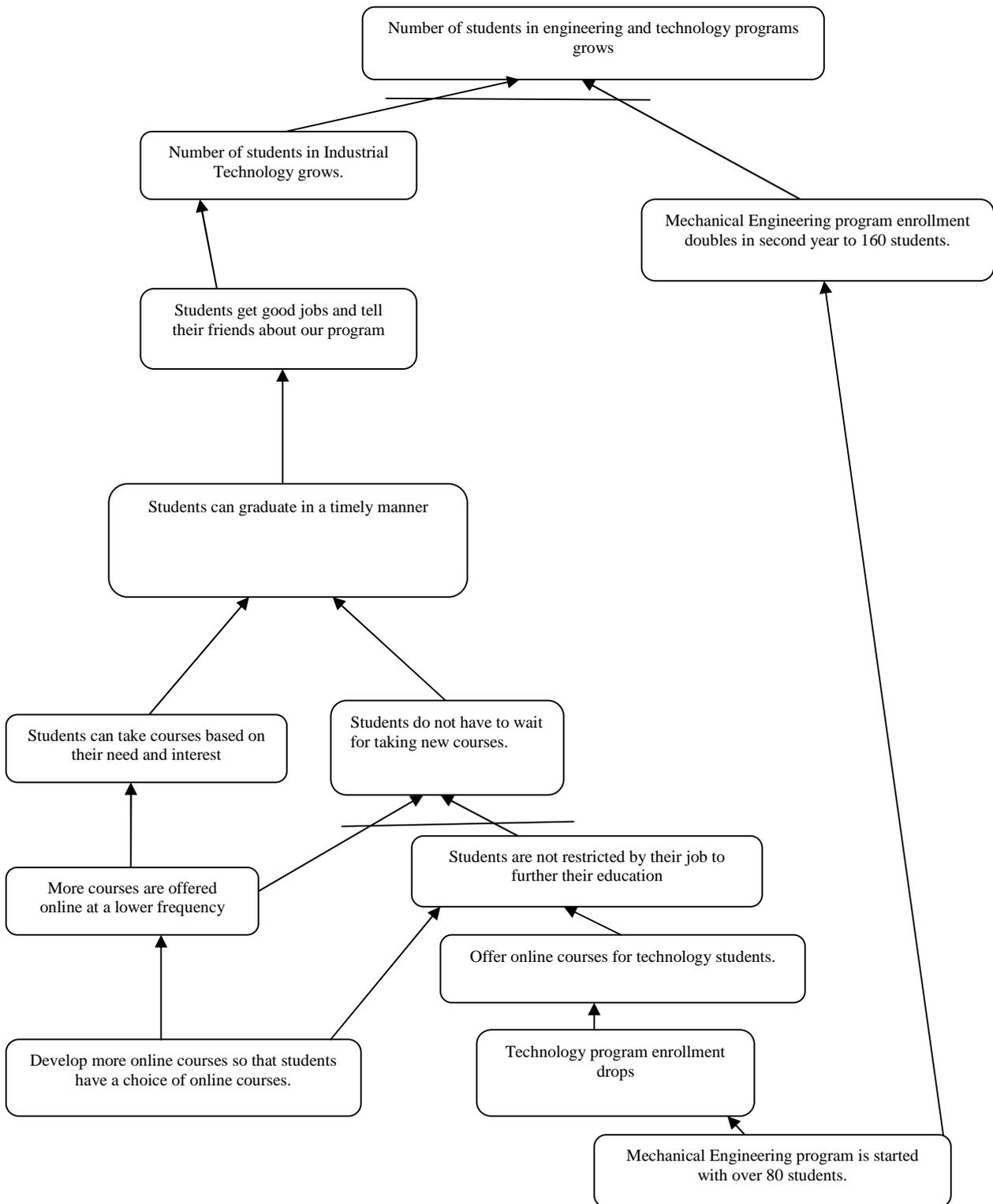


Goldratt contends that compromising does not solve the core problem though short-term success may be realized. He suggests using the Evaporating Cloud (EC) (Figure 2 – Evaporative Cloud with Injections) to search for real solutions that will break the conflict that bring about a win-win solution for everyone. The injection in this instance is: Offer online courses in industrial technology to build industrial technology enrollment. This tool will logically show that once the injections are implemented, the desirable effects can be accomplished.

When the EC is broken, the Future Reality Tree (FRT) is built using the injections from the EC (Figure 3 – Future Reality Tree). A Future Reality Tree (FRT) was then constructed in an effort to assure that all of the Undesirable Effects (UDE's) would be eliminated using the resolution identified in the Evaporative Cloud (EC). The FRT is essentially the same as the Current Reality Tree (CRT); however the injection(s) identified in the EC are placed into the tree to create a vision of the “future reality.”



**Fig 2:** Evaporative Cloud with Injections



**Fig 3:** Future Reality Tree

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#### 4. PROJECT IMPLEMENTATION

A two year online course rotation cycle was developed for the Industrial Technology courses. It is shown in Table 1. One new course is put online in Blackboard each spring and fall semester till we have all the courses online in the spring of 2015. As per the rotation cycle most courses will be taught only once in two years after the cycle is complete. This will allow

students to take the course they are interested in during their junior or senior year. Two courses have to be taught once a year because we also serve the management online completion program. The Petroleum Technology courses are also taught every year because the faculty has agreed to develop only three online courses. As more online courses are available, they can be taught less frequently, and enrollment will be higher.

**Table 1:** Full program completion rotation cycle

Course Description		Yr 1	Yr 1	Yr 1	Yr 2	Yr 2	Yr 2	Yr 3	Yr 3	Yr 3	Yr 4	Yr 4	Yr 4	Yr 5	Yr 5	Yr 5
Course no.	Course title	Fa12	Sp13	Su13	Fa13	Sp14	Su14	Fa14	Sp15	Su15	Fa15	Sp16	Su16	Fa16	Sp17	Su17
ITEC 3305	Industrial Safety and Health					X			X			X			X	
ITEC 3307/MNGT 3340	Project Management		X					X			X			X		
ITEC 3380/MNGT 3380	Managing Technology	X	X			X			X			X			X	
ITEC 4380/MNGT 4380	Total Quality Management		X			X			X			X			X	
ITEC 3390	Technology & Society	X													X	
ITEC 4302	Innovation				X									X		
ITEC 4310	Energy Technology				X				X					X		
ITEC 3340	Facilities Design							X			X					
ITEC 4303	Environmental Technology					X					X					
ITEC 3310	Manufacturing Technology	X			X		X			X			X			X
ITEC 4340	Construction Technology								X			X				
PTEC 3301/PENG 2301	Petroleum Fundamentals	X			X			X			X			X		
PTEC 3302	Petroleum Fluids and Gas Technology			X				X		X			X			X
PTEC 4302	Pipeline Technology			X			X			X			X			X
PTEC 3304	Drilling Technology					X			X			X			X	

## 5. INCENTIVES FOR DEVELOPING ONLINE COURSES

Roblyer<sup>3</sup> found that many administrators fear that schools will become extinct if they do not offer web based distance education courses. A 2006 survey of online learning of over 2, 200 colleges and universities in the United States showed that nearly 3.2 million students took one or more online courses in 2005 representing close to 17 percent of all higher education students<sup>4</sup>. The number of online students has shown a growth of 20 percent annually since 2002 with a 35 percent growth in 2005. Online learning is predicted to become a dominant form of training within organizations in the future<sup>5</sup>.

Universities are making a major push towards offering online courses. The instructor has to change roles with changing platforms. Some instructors who taught online felt that they were not rewarded for the extra work

and time needed to prepare and execute the online courses<sup>6</sup>. Faculty should be given a release time or stipend to develop online courses<sup>7</sup>. Most universities offer incentives for faculty teaching on-line courses<sup>8</sup>. The incentives include a small monetary reward and/or a reduction in the teaching load during the semester the course is taught.

To speed the development of U.T.P.B.'s online courses and to speed the development of courses dealing with energy topics, our Provost and Vice President for Academic Affairs sent out an announcement offering a new incentive program. The new incentives provided stipends and support funding for programs. Requests had to be submitted through our dean. The incentives are shown in the table 1.

**Table 2:** Incentive Program for Online Courses and Programs at U.T.P.B.

	Course Developer	Program Marketing/Support
New Online energy course as part of a new online program	\$7,000	\$1,000
New Online energy courses	\$6,000	
New Online course as part of a new online program	\$5,000	\$1,000
New Online course	\$4,000	
New energy course <100% online as part of a new program (Face-to-face, Hybrid, Web-enhanced))	\$3,000	\$1,000
New energy course <100% Online (Face-to-face, Hybrid, Web-enhanced)	\$2,000	
Modify existing online course as part of a new online degree program	\$1,000	\$1,000

Proposals for new program funding had to describe:

1. The course name and basic description
2. Learning outcomes of the course and proposed assessments
3. Target audience for the course and description of the demand for the course
4. A timeline for the development of courses.

## 6. SUMMARY AND CONCLUSIONS

The advantages of online education are learning anytime and anywhere which is especially good for working adults including those that have to travel as part of their job. The use of online education in technical education is growing. E-learning is the new name applied to internet based online education. Online education also helps with scheduling and program costs. Many online students are older working adults balancing studies with demand of family and work. The time commitment associated with online education slows down the process of offering more courses online<sup>9</sup>. Since the program was implemented in fall 2011, my enrollment has grown to

over a hundred students per semester. The results are shown in Table 2. This shows that the implementation of

Goldratt's Theory was successful in improving enrollment in the online courses and serving the working professionals.

Term	Fall 2011	Spring 2012	Fall 2012
Total # of Students in Online Classes	91	109	127

**Table 3:** Enrollment Results

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Dr. Raj Desai is the founding faculty member of the Department of Engineering and Technology. Dr. Raj Desai currently serves as Chair, Undergraduate Studies, College of Business and Engineering at the University of Texas of the Permian Basin. His research interests are in the fields of leadership, innovation, and new technologies.

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