

Learning By Doing from EPICS (Engineering Projects in Community Services)

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Abstract:

The importance and effectiveness of faculty training programs to enhance and elevate faculty members' professional abilities in teaching are well documented in the literature knowledge based on a subject matter is not enough to claim competency in teaching. Besides subject matter, teaching professional competency requires additional "nonacademic" knowledge (i.e. social, administrative and technical). This analogy for faculty competency was supported in a report developed by Hendriks, M et.al. [4] [2010]. EPICS (Engineering Projects In Community Service). There is a need of skilled faculty, this paper describes about learning's of the epics faculty from a failure project. The method which followed is the epics design process and the result showed that a lot of learning's happening in the process of developing a project. Though the project has failed but we could gain immense experience through this project. The present paper gives an insight into our experience.

Keywords: EPICS, learning's, Faculty training, design process, Experience.

Introduction

In the study the paper describes the training conducted for faculty to increase their professional skills to be delivered to the student s for (N=882), University of Dammam found that the training program is meant indirectly to improve students' learning outcomes. Abdulghani A et.al [2] [2013]. In the author's point of view training for the faculty increase the outcome of the students. Hendriks, M et.al. [4] [2010]. In the study the paper suggesting some strategies to avoid failures in their design for (N=68), Purdue University found that creating a failure typology that can help engineering students and practitioners avoid negative outcomes of their design Andrea Mazzurco & Brent K Jesiek [1] (2014)., The study explained on what factors the project I going to be succeeded and failed for (N=88), University of Pittsburgh, Johnstown found that team work and friendship were the leading factors of success in the project Tumkor Serdar [6]

(2015), in the study explained failure is an option to be successful for (N=550), Texas Tech University, it was found that failure is the power of collaboration Hansel Burley et.al[3] [2016], in the study Factors that Inhibit or Enable Success of Capstone Design Teams for (N=88) Villanova University, Villanova, PA 19087 it was found that team work and motivation are the factors to the success Tumkor Serdar [6] [2015]. According to the LeRoy Always [5] [2010] importance of faculty training we under went through the phase of faculty training in EPICS before the commencement of classes. According to Hansel Burley et.al[3] [2016] even though from a failure project one can learn meaningful learning's Hansel Burley explains one can explore more than previous work done.

In this paper we also agreed Andrea Mazzurco & Brent K Jesiek [1] [2014] design thinking that how we can acquire knowledge from failure projects which is going to help in our future projects to avoid negative outcomes when we facilitate new projects of students.

1. Method

As a faculty, got an opportunity to train in EPICS (Engineering Projects In Community Service) training program. Our EPICS trainer made us to go through EPICS design process which has 6 phases. By following theses design thinking phases we learned how to do the real time projects and how to understand the needs of the under serving people, and how to interact with community partners which needs assessment and brain storming.

a. Project identification:

In this phase, Gardeners in engineering college are our primary project partners in figure 2.

- The problems observed are, the gardener bending and cleaning the garden area which is difficult for a human being, who may get back pain, knee pain which leads to physical stress
- Gardeners are unable to clean the garden without emission of dust.

- Further, dust is getting accumulated while cleaning which is reducing the beauty of the campus.

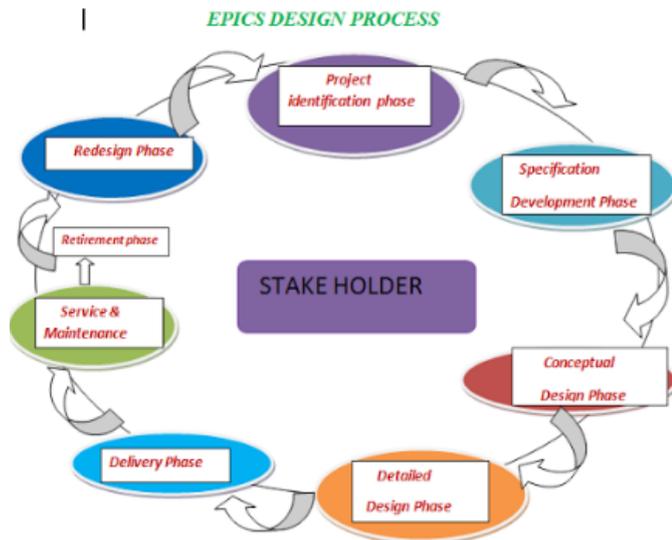


Figure 1. EPICS design process

- Based on the inputs, a product survey was done then came to know the Available devices in the market are complex and quiet expensive. To address this, we designed a cart sweeper to clean the garden without emitting dust.

c. Conceptual Design:

- In this phase our team came up with individual ideas, somehow not satisfied by all, but tried a prototype sample of project, showed to community partner, they were satisfied by applications of the project which reduces their stress, took the feedback to do with more modifications according to their requirements.



Figure 3. Prototype-1

Feedback from community partner for figure3:

- Design found was complex
- Want big and smooth brushes for effective cleaning.
- Wheels were lifting from the ground while moving

This feedback was taken into consideration and then we re-modelled it.

d. Detailed Design:

- In this phase, in detail the discussion held about the product implementation, design ,planning applications
- But the individual ideas are not accepted by all team members, differences arose among the team members regarding design, could not get the appropriate material required for product design which leads to the failure of product.
- The reflection of the above experience is lack of resources, lack of team work, lack of planning, lack of coordination among the team and motivation.
- In the below fig[4] Our project which could not become final product is shown.

e. Retirement:



Figure 2. gardeners Community partners

b. Specification Development:

- Met community partners (Gardeners) and understood the requirement.
- The problem they are facing is emission of dust during the cleaning process.
- Decided to design equipment which fulfils their need (no emission of dust during the cleaning process.)

- Our product has been designed up to proto type stage but not up to the functional specifications, so our product has not been delivered to community partner with which we were dissatisfied. Due to the lack of time team has decided to retire.
- Our project has not been turned in to product

f. Redesign:

Now our students are re-developing the project



Figure 4. Working model of the project.

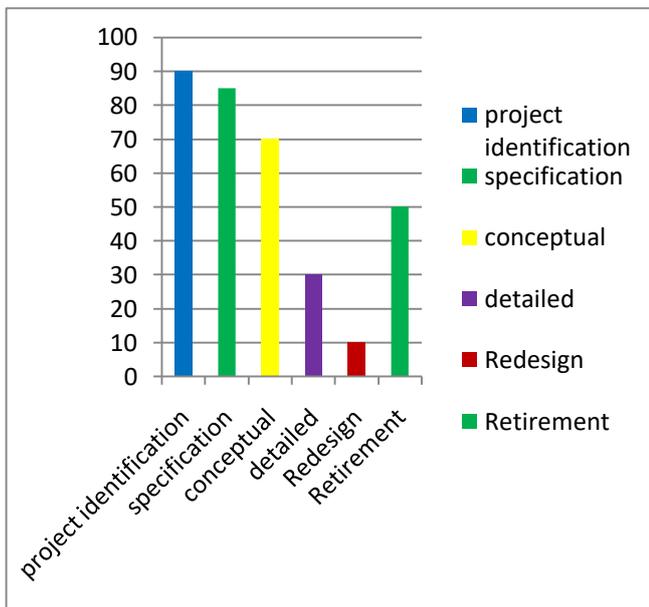


Figure 5 Involvement of Team in Design thinking process Approximately.

2. Results:

Results show that lot of learning’s in the process of developing a project. Though the project was a failure where our effort did not take the shape of an end product, but the experience we got was enriching. Through this

experience, we learnt that mutual understanding is important. Improper planning and lack of team work are the reasons for the failure. Giving due importance to each activity it develops the ability and skills of thinking and doing the activities, user involvement, the necessity of team work, time management, the need for skills and knowledge from many different disciplines and the art of solving technical problems, clear statement of requirements, coordination of team members motivation and many more we could learn from this project.

Learning from the project:

- Acquired experience.
- Understood the value of each activity
- Developed the ability and skills of thinking and doing the activities
- Acquired the skills and qualities of a Group activity
- User involvement
- Clear Statement of Requirements are understood.
- Proper Planning should have been done.

Challenges in the project:

- Incomplete Requirements
- Lack of user involvement
- Lack of Resources
- Unrealistic Expectations
- Changing Requirements & Specifications too often.
- Lack of Planning
- Lack of Team work
- Technical Incompetence

3. Discussion

According to Andrea Mazzurco & Brent K Jesiek [1] [2014], that creating a failure typology that can help engineering students and practitioners avoid negative outcomes of their design. our results are also consistent with the previous researchers saying that failures can contribute to a lot of learning’s in a better way Tumkor Serdar [6] [2015] and LeRoy Always [5] [2010] stated that team work and friendship, motivation are the important factors for the success of any project. In this study we are in agreement with the researches that teamwork and friendship, motivation were the most important factors for the success of the project. Hansel Burley et.al[3] [2016] in the study explained failure is an option to be successful agreed with author as we all know that failures are the stepping stones for success.

4. Conclusion & Limitation :

In this paper the faculty successfully completed all the phases of design thinking process. Though the project not turned into product learned lot of successful lessons from this failed attempt. The findings of this study are to be viewed in the context of some limitations. The study is based on a Faculty training In EPICS (Engineering projects in community services) during the college, time period of only one week was allotted. This turned as a limitation; otherwise

the project could have been completed if few more days were given for accomplishment.

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