DEVELOPING A DISSEMINATION PLAN

Jeffrey Froyd[1]

Abstract *¾ Each proposal to the National Science Foundation (NSF) seeking support for improving engineering education must include a plan for disseminating the innovations and results that a funded project will generate. Authors may select from a variety of tactics: papers published in archival journals, conference papers, workshops, web sites, multimedia CD-ROMs, books, conference exhibits, etc. Despite the wide variety of available tactics, dissemination plans often fail to account for the behavior of the faculty members that dissemination plans are designed to reach. Faculty members, like all people, make changes in stages instead of moving from pre-awareness to action in one giant step. Various models with different numbers of stages and a diverse selection of names and characteristics of the various stages have been offered. Despite the assortment of individual change models, the kernel truth that faculty members change in stages and that effective dissemination plans are designed to facilitate transitions one stage at a time should not be overlooked.*

The paper will present a six-stage model for individual change that has been employed in several industrial marketing plans: pre-awareness, awareness, interest, search, decision, and action. Characteristics of an individual at each stage in the change model will be presented. Once the nature of an individual at each stage is better understood, then appropriate dissemination tools that can help an individual move from one stage to the next will be explored. Exploration of tools will emphasize the observation that tools that are appropriate at one stage may be ineffective for individuals at a different stage. Hopefully, the individual change model and exploration of appropriate dissemination tools will help faculty members develop more effective dissemination plans

Index Terms ¾ Curricular change, dissemination, stages of change models

INTRODUCTION

Every faculty member who has authored a proposal to the National Science Foundation (NSF) is required to submit both an assessment plan and a dissemination plan in the proposal. Ten years ago developing an assessment plan was a significant challenge and there were few easily accessible resources to assist faculty members. Today, knowledge about assessment has significantly increased because of the EC2000 criteria from ABET and outcome-based criteria from several regional accreditation organizations. However, resources for developing a dissemination plan are fewer and accreditation organizations are not driving development of dissemination plans. If the purpose of a dissemination plan is simply to add to the existing knowledge base, then the typical plan that proposes conference and journal articles as well as a web site is sufficient. However, if the purpose of a dissemination plan is to facilitate exploration of the results of the project and encourage consideration of adopting useful features of the project, then a more systematic approach appears necessary.

For example, a typical dissemination vehicle mentioned in proposals is a journal article. Journal articles are a common method of informing the community of disciplinary researchers in a specific area who read journals characteristic of the research area. However, the effectiveness of publication in a journal on engineering education differs from dissemination within a disciplinary research arena because faculty members who might be interested in a curricular or pedagogical initiative may not know where to find information about the initiative. Many faculty members with possible interest in a curricular renewal initiative may not read the Journal of Engineering Education or International Journal of Engineering Education and find out about the project. Further, faculty members who might start reading a single paper in say, the IEEE Transaction on Education, do not necessarily have the background that the authors of the paper might assume. This is not an oversight by the authors who were writing for the typical audience of the journal. When a faculty member who is well versed in a particular research area, e.g., neural networks, reads an article in the IEEE Transactions on Neural Networks, he/she brings a background that enables her/him to understand the context in which the paper was developed and only a few words are necessary to refer a particular set of assumptions that underpin development in a particular topic. However, when the same faculty member reads an initial article in the Journal of Engineering Education, she/he may be unfamiliar with the context in which the article was developed and the assumptions that underlie the research being reported. Therefore, the article may be less than effective in informing the reader about the results of the research. If the experiences of individual readers who are unfamiliar with journals on engineering education or unfamiliar with contexts in which the articles are published is repeated many times, it becomes clearer why journal articles may be less than effective in disseminating results of a curricular renewal initiative.

[1] Jeffrey Froyd, Texas A&M University, Department of Electrical Engineering, Zachry Engineering Center, MS3128, College Station, TX 77843-3128, froyd@ee.tamu.edu

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If an alterative to the typical mixture of web sites, journal articles and conference articles is sought, then a framework for a comprehensive dissemination plan is a reasonable first step. Then, strategies that build on the framework might be provided. The framework proposed in this paper is the stages of individual change model. First, the general idea of a stages of change model is proposed. Next, a particular staged change model, called the change readiness model, is proposed based on a collaboration between the Foundation Coalition and Raytheon. Finally, some strategies based on the change readiness model are offered as suggestions to help authors prepare innovative dissemination plans.

STAGES OF CHANGE MODELS

Research from many different areas strongly suggests that individuals do not move from knowing little or nothing about a particular topic to acting upon acquired knowledge in a single step. Instead, research in many areas, e.g., quitting smoking, becoming a self-directed learner, and marketing indicates that individuals move through change in stages.

Smoking

In quitting smoking the stages of change model, developed by Prochaska and DiClemente [1-3], focuses on the process of quitting as behavioral change. [4]. The five stages in the model are pre-contemplation, contemplation, preparation, action and maintenance.

Pre-contemplation: Pre-contemplation is the initial stage when a person either enjoys smoking and isn't thinking about quitting or believes that quitting is impossible and so is unwilling to try. Since this is the initial stage, information and tools must be found in order to start a smoker on the path toward quitting. Information at this stage should focus on why quitting is important and possible.

Contemplation: At contemplation a smoker begins thinking seriously about the health dangers associated with smoking and starts to gather information about cessation. Since a decision about whether to quit has not yet been made, support for quitting from family and friends can be particularly helpful. Additional information about health risks can also be effective.

Preparation: Now, a smoker is truly ready to quit and he/she sets a quit day that is at most a month away and decides on a specific approach. Small changes in behavior that can facilitate the quitting process.

Action: In action, a smoker implements his/her decision to quit and sets the plan in motion. The action phase can take a few days, a few weeks or a few months. Action is when the smoker changes his or her behavior – from smoking to NOT smoking.

Maintenance: This is the stage that represents success. It means that a former smoker has remained smoke free for a significant period of time – usually six months or a year.

Self-Directed Learning

Table 1 shows the four stages in the staged self-directed learning model proposed by Grow [5]. The table shows the four stages, the characteristic mode of the learner in each stage, possible roles for the teacher to facilitate learning with students at that stage, and examples of the types of interaction between teacher and learner that could be expected.

Table 1. Grow Staged Self-Directed Learning Model

	Student	Roles for a Teacher	Examples of Learner/Teacher Interaction
Stage 1	Dependent	Authority, coach	Coaching with immediate feedback. Drill. Informational lecture. Overcoming deficiencies and resistance.
Stage 2	Interested	Motivator, guide	Inspiring lecture plus guided discussion. Goal setting and learning strategies.
Stage 3	Involved	Facilitator	Discussion facilitated by teacher who participates as equal. Seminar. Projects.
Stage 4	Self-directed	Consultant, delegator	Internship, dissertation, individual work or self-directed study-group.

Marketing

When Raytheon wanted to help its suppliers improve their timeliness and quality through time-based manufacturing techniques, the team in charge of working with the suppliers developed a model of supplier change readiness. The change readiness model served as a framework for developing information and tools to encourage their suppliers to adopt time-based manufacturing techniques. Initially, the Raytheon team offered an eight-hour workshop that pointed out the most compelling reasons for change and

described the assistance Raytheon was willing and able to provide. Internally, the workshop was referred to as the "silver bullet". However, the team began to recognize that it was delivering the workshop to suppliers who weren't ready to hear the arguments and offers being presented in the workshop. [6] So the team developed the change readiness model based on a marketing workshop offered by Dr. Gwen Ortmeyer. [7] In the workshop on change [6] that Raytheon arranged for the Foundation Coalition, the following staged model of change was presented.

- **Zero**: Typically a small, privately owned company that hasn't recognized the change in market expectations and demand. Often they have no planning function, do a lot of expediting, and think that type of management is normal/preferred.
- **Awareness**: The company management has done some reading, perhaps "The Goal" by Goldratt and Cox [8]. They have done some benchmarking with other companies, and/or recognize the need for better operational performance with respect to lead-time and on-time deliveries.
- **Knowledge**: The company management is educated on time-based management and recognizes a need to improve their operations. There is minimal hand walking and expediting of product. Often the management knows there is a better way to run their business but just doesn't know how to apply the principles.
- **Attitude**: They believe time based management is worth pursuing or they clearly do not. Or, they have a educated preference between different time-based management tools (i.e., DFT, CFM, Synchronous Flow, etc. (key word here is "educated")
- **Commit**: The company is currently making measurable improvements to their operations that are impacting both lead-time and on-time deliveries to Raytheon. Also company has made a commitment to practice time-based management techniques for operational improvements.

Summary: Stages of Change Models

Although there are some significant differences among the three stages of change models, there are important common elements. First, people in the initial stages of individual change are unaware of the opportunity or need for change and the responsibility for initiative rests with other individuals. For example, learners in stage 1 of Grow's model rely on the teacher to provide the learning goals and the activities through which the learning goals may be achieved. Second, the amount of time that people in the initial stages are willing to invest in learning about new opportunities is minimal. Smokers in the pre-contemplation stage are unlikely to attend a two-hour presentation on the health hazards of smoking. Students often complain about the amount of time that an assignment takes to complete. Third, as an individual moves to later stages, he/she begins to accept responsibility to initiate action and she/he is willing to invest more time in learning about the need or opportunity. From these common elements, a model for faculty change can be synthesized..

FACULTY CHANGE READINESS MODEL

Although several models of staged individual change have been presented, their focus was not faculty members considering curricular or pedagogical change. Drawing strongly on the marketing model, the following six-stage model for curricular/pedagogical change readiness is proposed.

- **Pre-awareness:** In pre-awareness faculty members know little or nothing about a pedagogical or curricular project or innovation. At this stage they will invest only a small amount of time, say at most twenty minutes, to become more familiar with the nature of the project. They would be seeking relatively brief answers to questions like, "What is the purpose of the project?", "Why should I be interested?", "Where is the literature that supports the results of the project?", or "Where might I go to learn more?"
- **Awareness**: At this stage, a faculty member associates the name of an innovation or project with a brief description of its nature. They may need repeated exposures to information before they reach this stage. Faculty members in the awareness stage may be willing to invest more time to learn about the project, perhaps up to an hour. They might explore more detailed answers to what, why or how questions.
- **Interest**: Now, faculty members may be willing to read articles about the project or innovation when they come to the faculty member. They will invest more time and may initiate scans for additional information.
- **Search**: In search, faculty members will actively seek more information about the project or innovation. For example, they might search the web for sites with information about the project. They might do a literature search or ask colleagues for further information. This is the first stage where a faculty member begins to take initiative instead of waiting for information to arrive.
- **Decision**: At this stage, faculty members are actively seeking information that will help them make a decision on whether to adopt the innovation or use the results of the project. They are willing to participate in workshops, either on their own campus or off site. They will talk to colleagues about the merits and drawbacks of the project.
- **Action**: Now, a faculty member has decided to adopt the innovation or use the results of a project in her/his own courses. A faculty member seeks information that will assist the implementation, e.g., one or two day workshops.

At his point many questions could be raised about the proposed faculty change model. For example, a question about the number of stages could be raised. Maybe five or

seven stages would be more accurate. Perhaps, the awareness and interest stages could be collapsed into a single stage. Questions could be raised about the criteria dividing the different stages. For example, maybe the descriptions of search and decision could be changed to more precisely describe the differences. In general, it is the opinion of the author that similar questions could be raised about any stages of change model. Instead, the point of each model is to realize that people move from one end of the model to the other in stages and that interventions or tools should be designed to facilitate transitions between particular stage. Facilitating transitions between stages is a completely different mindset than expecting that a single tool, e.g., workshop, journal article, will move a faculty member from pre-awareness to action in a single step. The purpose of the stages of faculty change model is to provide a framework, however shaky, for deciding what tools will be developed for disseminating information about a curricular/pedgagogical project or innovation.

Table 2 describes some tools that might be used to facilitate a transition from one stage to the next stage. The tools are placed in the column associated with the next stage. For, example, tools placed in the awareness column might be used to facilitate a transition from pre-awareness to awareness. Tools designed to facilitate the transition from pre-awareness to awareness rely on the initiative of other individuals to place the information in the hands of target individuals. One-page summaries or flyers could be hard-mailed or e-mailed to individuals or handed to people at conference exhibits. Although a short video might be effective, it is hard to imagine ways in which the video could be transmitted to individuals without the individual investing some effort to access the video. Tools to facilitate the transition from pre-awareness to awarenss will focus on the essential features of a project and identify why a project might be interesting to the target audience. If readers think that the stages of faculty change model has merit for helping them design dissemination tools, they are likely to be more creative than the author in devising effective tools.

Table 2. Dissemination Tools Appropriate to Stages of Faculty Change

Very High---------- Responsibility for External Initiation ----------Very Low Very Low----------Receiver Ownership ----------Very High				
Awareness	**Interest**	**Search**	**Decision**	**Action**
One page summary of a curricular project Flyers Short videos Brochures with brief descriptions of selected results	Longer summaries of a curricular project Short multimedia CD-ROM	Journal publications Conference publications Web site containing project descriptions, instructional materials, assessment and results	2-4 hour workshops offered at conferences or on site CD-ROM containing the entire web site	1-2 day workshops Course manuscripts Project descriptions Example lesson plans

Two tools have been offered that might help facilitate the transition from awareness to interest. Longer summaries could address more questions than the shorter summaries in column one or they might address the same questions in more depth. Multimedia CD-ROMs could be prepared using text, animations, video and sound to maintain attention. However, tools that facilitate the transition from awareness to interest will have to be transmitted to the faculty members somehow.

Once a faculty member has reached the interest stage she/he may initiate scans to find additional information. Here is where more traditional tools such as web sites, journal articles and conference articles may facilitate the transition to the search stage. These are tools that a faculty member could find via a scan of the literature or the web.

For the last two stages, tools that provide in-depth information can facilitate the transitions because a faculty member is willing to invest a substantial amount of time to gain an in-depth understanding of the project or innovation. Workshops, instructional materials and content-rich CD-ROMs are suggested tools.

CONCLUSIONS

The paper has suggested that traditional dissemination tools alone are inadequate to promote familiarity with and use of curricular and/or pedagogical innovations. Based on several changes of stage models that have been proposed in several different arenas, the paper suggests that a changes of stage model may be a useful framework to understand the change from knowing little or nothing about an innovation to actively using it in the classroom. Further, a six-stage change model was proposed as a framework for constructing a dissemination plan. Traditional tools may help facilitate one or two of the transitions, but they don't seem to be adequate to facilitate all the necessary transitions. Tools that might facilitate each transition in the framework were then suggested. Creative readers might be able to suggest

additional tools. Once a table like Table 2 has been completed, implementing a dissemination plan would require selecting one or tools from each column and then generating these tools. Hopefully, the stages of change framework will generate additional discussion about approaches to thinking about ways to envision and implement a dissemination plan.

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