AC 2009-1127: EMBEDDING FACULTY INTO INDUSTRY: UNDERSTANDING THE REAL WORLD EXPECTATIONS OF OUR GRADUATES

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Embedding Faculty into Industry: Understanding the Real World Expectations of Our Graduates

Abstract

Engineering technology students face intense educational demands in school. Their faculty, challenged to develop coursework that balances theory and applied principles, endeavor to create an environment that mirrors the rigor of real-world industry demands. As job descriptions continue to broaden under a constantly evolving tsunami of technology, hardware, and software solutions, professors have less time to ensure that information disseminated to their students parallels the current needs of their industry partners. This problem is commonplace for many faculty, whose goal is to offer the most relevant classroom experience possible to their students. One solution may be overtly obvious; faculty should embed themselves in the industry fields where their students will ultimately gain employment.

In the summer of 2008, the authors took part in the Faculty Education Program hosted by Rhythm + Hues in Los Angeles, California, a world leader in realistic, three-dimensional animation and special effects for the film industry. Digital production in Hollywood represents an innovative front of technological problem solving. In this arena professors can evaluate the relevancy of their technological curriculum, as well as the context of their own craftsmanship, by participating in summer embedding programs with intense production environments.

This paper details the experiences and lessons learned through a comprehensive explanation of the Rhythm + Hues Faculty Education Program. Furthermore, the authors describe how this model can be applied to strengthen the professional and pedagogical development of other faculty, regardless of their engineering technology discipline.

Introduction

Faculty today are often inundated with responsibilities that span advising to research. Time is scarce, and anyone who teaches technology courses quickly understands the challenge of remaining current with best practices in theory and application that are utilized in industry. An arduously developed classroom lecture, demonstration or exercise can, and often does, become extraneous in mere weeks with the advent of a new software suite or technology. The constant cycle of developing new teaching materials to replace outdated versions can be a daunting change. When discussing the creation of an innovative educational environment, Maier and Weidner write, “As a general matter, innovation represents change, and there is usually built-in resistance to change.” Engineering technology faculty are a part of a field that must embrace change. However, this “built-in resistance” often stems from the reinvestment of the time required to master new technologies and maintain quality-learning environments in the classroom. Therefore, increased value is placed upon the instructor’s technical expertise and dissemination as students become more technologically sophisticated.

Is the mastery of contemporary technological theory and application alone enough to adequately prepare students for the workplace? Is there a fundamental disassociation between what is being
taught and learned in the classroom versus the cultural expectation in industry? Typically new employees are hired for interpersonal and technical skills, and after time are socialized into industry culture. 2 Whereas the understanding of software and theory may grant employment, success in the field revolves around creative leadership and knowledge of how the industry culture functions. 3 For the full-time technology educator, this poses another significant problem: training students for a rapidly evolving industry in which the educator doesn’t actively belong.

Throughout the country, engineering technology curricula require internship credits for undergraduate and graduate students. This opportunity provides a method for the student to gain insight into the industry culture. Faculty can benefit from a similar idea: embedding themselves in the industry fields where their students will ultimately gain employment. John Van Vliet, a Special Effects Supervisor whose film credits span Tron (1982) to Marley and Me (2008), believes embedding faculty into industry provides valuable information that can contribute to the future success of students:

Being [embedded] will enable you to better understand the workflow and the skills necessary to succeed in this business. But the most important thing you’ll experience (and the one thing that most schools don’t teach) is how the “culture” works. The film community has its own community/culture and the visual effects group has its own subculture within that group. I see a lot of people show up in Hollywood oblivious to this and if they somehow do manage to land a job, often blow it by not understanding how their new world works. 4

To fully prepare engineering technology students, regardless of discipline, for successful futures in industry an effort must be made to incorporate the culture of that field into the curriculum. Embedding faculty into industry culture reinforces concepts such as hardware/ software solutions and discloses intangible ideas such as workplace expectation, policy and procedure for students.

Background

John Hughes earned both his bachelor’s and master’s degrees rooted in electrical engineering. The innovations he contributed to the motion picture industry were engineering ones, chiefly motion control camera systems necessary for the integration of computer-generated (CG) effects. 5 From this innovation Hughes founded Rhythm + Hues in 1987 to capitalize on the rising demand for CG effects. Their specialty is quadruped animation, and mouth-replacement animation effects for animals, which earned the studio a Visual Effects Academy Award for the movie, Babe (1995). 6 The studio also received both critical and Academy recognition for Visual Effects in The Chronicles of Narnia: The Lion, The Witch, and the Wardrobe in 2005.

Hughes is “committed to improving education for California students…” 6 and maintains an active presence in several education boards across the state. Hughes is carrying on a tradition largely attributed to the early days of CG Animation, where open cooperation between researchers and artisans developed the earliest full-screen digital effects, later to become Pixar. The company still “[stays] close to innovations happening in the academic community.” 7
Collaboration, therefore, is the essence of embedding; an integral component of higher education because it is required for the workplace for which we prepare our students.\textsuperscript{8}

The philosophy of Rhythm + Hues founder John Hughes, the Faculty Education Program, and the experience of the authors have a direct bearing on the format and discourse of faculty embedding. Through the articulation of these facets we endeavor to address the many fields where embedding may occur.

Rhythm + Hues’ Faculty Education Program reaches out to U.S. educators in order to better identify potential student candidates, improve understanding and contributions to curricula, and enhance academic-to-industry relationships. The program format incorporates five phases: 1) call for participants, 2) orientation and daily operations, 3) global overview, 4) department overviews, and 5) participant feedback. The sequence of events is listed below for the Rhythm + Hues (R+H) Program. This model provides a structured, yet flexible format easily adapted for a variety of different industries that desire to embed academics.

**Call for Participants**

In this phase, R+H screened possible faculty candidates in the areas of knowledge domain, curricular content and technological relevancy to ascertain a potential match with the studio’s goals. The authors of this paper could best be described as contemporary practitioners of digital graphics whose skills span interactive design, three-dimensional graphics, illustration, and animation preproduction work. The authors were selected to participate in the Faculty Education Program because they teach the applied communication of graphics and therefore have a chance to positively influence the next potential group of R+H employees. It is relevant to stress, in this case, R+H was very adamant to ensure that the instructor’s current class load best reflected the desired skills needed within the studio. This precaution eliminated the chance of incorporating an educator into the program who was merely a curious fan of Hollywood special effects, rather than an educator who could transfer specific R+H skills and ideology to the classroom.

**Call for Participants: Analysis**

Central to success during this phase is the ability to determine the technological relevancy, knowledge discipline, and the theory/application alignment of the participating educator with the industry partner. Preparing the answers to several fundamental questions during this phase could provide insight into a possible collaboration between academician and industry.

- Does the educator or academic program currently route students, or have graduates currently employed, with this potential industry partner?
- Is the knowledge of the educator peripheral or central to the potential embedding industry?

The correct complement of knowledge domain to industry practice can provide future collaboration and well-trained candidates for the business. In addition, the distinction between theory-based and application-based instruction can establish the style of embedding employed. Whereas the R+H program is perfectly suited for theory-based professors, it is the author’s
intentions to emphasize the need for a practice-based embedding program.

**Orientation and Daily Operations**

The elected candidates were compensated for airfare and accommodations during the Faculty Education Program. Upon faculty arrival to the R+H studio in Los Angeles, an informal talk was scheduled with many of the week’s featured speakers. A facility tour was arranged to welcome faculty to the program and establish a layout of the various production environments. Perhaps the most intriguing recurring activity of the week was introduced on this day. Faculty participants were able to witness the interaction and feedback between studio executives and departmental supervisors over the progress from the previous day. This daily progress or “dailies” represented the director’s paid time with the R+H studio. As each clip, with some as brief as a few seconds, was projected in front of all departmental supervisors, the director offered his verbal feedback. Afterwards, any department involved in the execution of that particular shot was given these notes and planned to revise accordingly. In most cases, improvement was expected during the next daily session. This activity, not often seen by the public, allowed the authors to glimpse the instigating forces of the R+H pipeline. Although silence was strictly enforced, the dailies allowed faculty to fully comprehend the level of expectation, layers of departmental involvement, utilization of proprietary software, and perhaps most importantly the level of time management enforced for these large budget productions. The large budgets of Hollywood movies are well known, but the level of time management enforced for such large budgets is not.

**Orientation and Daily Operations Overview: Analysis**

After witnessing the discussion that surrounded the dailies, the authors were able to draw a correlation that would directly benefit the classroom environment. Through class critique and project evaluations, the incorporation of “academic dailies” would provide feedback in a manner that would instill both the practice and culture of its industry equivalent.

It cannot be overstated that faculty need to understand the driving forces behind the industry with which they are embedded. Educators aspire to not only teach the founding principles of a discipline, but the very factors that influence its economic well-being.

**Global Overview**

A team of Faculty Educators from R+H disclosed a comprehensive, global overview of the studio pipeline to faculty to facilitate better context between departments and their upcoming presentations. At three hours in length, this session served as the foundation for our education for the week. Each department discipline in the production pipeline was defined and elaborated through Q&A, but not with the same rigor, as each department would define itself later.

**Global Overview: Analysis**

Simply put, every embedding industry needs to elaborate on the instigation/deliverable life cycle of a project. After analysis of the individual departmental pieces that contribute to production,
faculty more readily understands the pipeline and therefore become better equipped to teach that environment to their students.

Department Overviews

The departmental overviews provided in-depth understanding of the production interworking of each area of R+H. A thirty-minute discussion was led by each department supervisor and began by defining the discipline and its role in the company. Every supervisor provided actual examples from production footage, in attempts to best clarify the day-to-day obligations of the department. Often supervisors highlighted the multiple iterations created in response to the dailies from that time. Some departments showed archival footage – in this case, *The Mummy: Tomb of the Dragon Emperor*, which was scheduled for release the following Friday. Other departments showed in-progress footage from *They Came From Upstairs* and *Cirque Du Freak*. The experience was similar to watching DVD extras content, albeit combined with the opportunity for personal questions and insight. More importantly, the footage examples often illustrated the discipline better through the problem solving inspired from the director’s revisions. Each department concluded with their expectations for applicants in their discipline, and ideas on how to improve the curricula to better reflect the current industry practice. Several supervisors allowed observation of portfolio and resume grading; providing key insight on how best to prepare students for R+H employment.

R+H is no different from most industries in that they have “star” positions that receive the highest volume of submissions: animation and animation effects. Additionally, positions exist to support the “star” positions: rigging, research and development and tracking. What the varying departments helped to clarify for the faculty is the obscure disciplines that create a bridge between others throughout production. 2D animation, for example, enhances the realism of the other departments’ production in a variety of methods. The 2D animation department commonly employed work involving the creation of shadows cast by virtual characters, or eliminating a limb to be replaced with a CG element. Due to this newfound awareness, these bridge positions, which were previously unknown, will now be discussed in the classroom. Disseminating this “inside” information into the classroom represents one of the many benefits of embedding faculty into industry.

Department Overviews: Analysis

The authors recommend a sequence of questioning which faculty should bring to bear when interacting with various departments in a company organization:

- What is this discipline of study associated with this department?
- What knowledge helps one to excel?
- What are the challenges facing this discipline?
- What personalities fail at this discipline?
- What assignments might be included in a curriculum for this discipline?

If a department, within their doors, has the opportunity to address all of these issues among faculty the results of the experience will be cyclical. The departmental goals will become more
transparent, and the likelihood of finding appropriately skilled candidates will increase. Additionally, the faculty will better understand these departmental goals, and will thus better educate students for these positions.

**Participant Feedback**

Open dialogue between the embedding industry and its participants allow both parties to reap the rewards of collaboration. The culmination of the forty-hour embedding process was an exchange of feedback, and all department heads listened as the faculty discussed the merits and opportunities for improvement to the Faculty Education Program. This participant feedback session underlined an investment at the corporate level to ensure that more highly trained students will enter the workforce with more realistic expectations. This informal discussion provided great collateral feedback as the industry learned about the current state of graphics education, and faculty solidified their experience with their industry partners.

The embedding program as planned and implemented by Rhythm & Hues is a perfect model for theory-based professors. It allows a safe distance from the important operations of the studio while still providing the depth of knowledge necessary for curricular incorporation. This model can be adapted by any industry willing to recruit personnel within their ranks and seriously assess their needs and the curriculum of the participants.

Embedding can entail three stages of participation. It is the opinion of the authors that the model below would serve both parties of the embedding process.

**A Three-Stage Embedding Model for Applied-based Professors**

In Three-Stage Embedding, the embedded professor moves from theory, to practice and simulation, to shadowing. This will help the embedding industry filter professors who may not be ready for the demands of shadowing and introduce professors to their curricula in a practical, more integrated way.

This initial stage of this model is *Theory*, and is the precise model as practiced by R+H. It is appropriate for any professor instructing in relevant or peripheral fields. Five days is sufficient for this stage of embedding, as any hands on training may, in fact, slow down the delivery of information. This stage is extremely inclusive and can be given to the widest range of participants.

The second stage of this model is *Practice*, and is divided into two levels of mastery. First, the embedding industry assigns prepared tasks culled from their own production and tailored to measure a single result. In the case of R+H, this might include a single assignment from each department. 2D animation (mentioned earlier) might assign the erasure of an actor’s limb in a traveling camera scene within a certain time limit. The hands-on assignment may reveal nuances not apparent in general discussion, and can also be provided to the students in the professor’s own curriculum. A professor adequately handling this level may move on to Simulation.

In Simulation, the professor is provided with a duplicate of a current, real task already being
completed by an employee of the embedding industry. The digital nature of technological industries, which this paper addresses, allows for duplication of whole projects without destruction of the original. The professor is expected to complete this task, but is contractually obligated to non-disclosure and non-usage. The imbedding industry is contractually held not to use the finished task for any reason. This stage can last anywhere from two weeks to one month. However, this task will assess if the professor is qualified for the final stage.

The third and final stage of this model is Shadowing. Here, the professor is fully embedded in the hosting industry, working on real assignments and under contractual obligation of non-disclosure. Ultimately, the goal is the preparation of skilled and culturally relevant student applicants for industry. For embedding to be a secure environment for both professor and industry, distinctions need to be articulated as to what can be shared in the classroom, with other schools, and with the press. The freedom encouraged by the security of all parties is what facilitates the sharing of information and the innovation of practice. The total length of a Three-stage Embedding experience is three months, the equivalent of a summer break, and during this stage the experience would be much more reflective of the experience of a new employee hired specifically for that role. Not only does the technology become applied, the embedded educator also experiences the culture of the work environment.

**Embedding Model for Applied-based Professors - Summary**

Whereas the example of this embedding process directly involves graphics technology, the authors believe that the benefits to industry, faculty and students, regardless of discipline are abundantly apparent. Industry, through active participation, gains a more knowledgeable and culturally aware talent pool that supports long-term goals. Professors receive current, more rigorous and often unidentified insights that contribute to professional development in a rapidly changing industry. Students, through the collaboration of industry and faculty, gain increased opportunities in the discipline they endeavor to practice. Whereas the concept where faculty and students work individually with industry is not uncommon, this unique triadic model of collaboration creates transparency of practice among all invested groups.

**Incorporation into Classroom Practice**

Upon completion of the Faculty Education Program at Rhythm + Hues, the authors were able to incorporate an abundance of information, or lessons learned, into the classroom. These ideas range from particular project specifications to over-arching classroom philosophies. These changes in pedagogy were implemented in the fall 2008 semester, only weeks after the embedding experience ended.

These curricular changes were a result of knowledge gleaned from the various discussions with discipline-specific supervisors, and represent an attempt to mirror the challenges and production issues faced within the R+H environment. Of the many changes to the curriculum, two direct course beneficiaries from the embedding process were CGT 341-Introduction to Character Animation and CGT 299-Portfolio Review. In CGT341, quadrupedal animation rigs and animal motion was included for the first time in order to accommodate the growing use of virtual CG animal characters, a R+H specialty. Prior to the inclusion of quadrupedal rigs, only bipedal
animation techniques were taught. Students now have direct experience with this particular type of animation control needed to simulate four-legged motion. In direct contrast to this specific type of applied knowledge, CGT 299 incorporated general changes to the curriculum. During the Faculty Education Program the authors witnessed actual portfolio reviews of several R+H applicants. Departmental supervisors gave feedback based upon the specificity of portfolio pieces and their relevance to the job requirements. After seeing the supervisor’s confusion while reviewing applicant portfolios that contained non-specific project examples, new guidelines were implemented into the class. CGT 299 now includes a more focused approach to assembling a portfolio that highlights position-specific skills.

In addition Student Dailies, which replicated the Dailies sessions at R+H, were incorporated in many CGT courses via daily and weekly project reviews and critiques. The benefits of these newly added sessions produced a noticeable improvement of the technical and aesthetic execution of student projects. As a result, the level of classroom participation increased dramatically. Students have improved their ability to produce high-quality graphics, but also the ability to discern what, in fact that process entails.

**Conclusion**

Faculty embedding reverses the role of the visiting, non-academic industry professionals who teach as adjunct faculty. For years this has served as the model for bringing real world experience to the classroom. With the implementation of the embedded faculty model, academics, whose strength is classroom education, have insight into industry and the ability to deliver that information directly to the students.

As discussed in this paper, the many benefits of this model are apparent. Within one semester of practice, this benefit is evident through the improvement of student work and attitude. Looking toward the future, the authors intend on developing relationships with local and national industry partners whose goals are relevant to other focus areas of the curriculum. In addition, the authors look forward to strengthening their relationship with R+H and developing an advanced education program.

**Bibliography**


