L. Borbye, M. Stocum, A. Woodall, C. Pearce, E. Sale, W. Barrett, L. Clontz, A. Peterson, and J. Shaeffer



Industry Immersion Learning

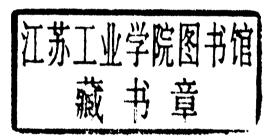
Real-Life Industry Case-Studies in Biotechnology and Business



Lisbeth Borbye, Michael Stocum, Alan Woodall, Cedric Pearce, Elaine Sale, William Barrett, Lucia Clontz, Amy Peterson, and John Shaeffer

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Preface

Graduates who secure their first jobs in industry typically spend a significant amount of time adjusting to the new environment because it is so different from the traditional university setting. Together with multiple industry professionals in the Research Triangle Park, North Carolina, I have introduced a learning method called "industry immersion learning" with the goal of easing the transition from the university to the workplace (here, the biotechnology industry).

The industry immersion method is characterized by need-based, innovation-oriented, and proactive acquisition of knowledge. The education is coordinated and supervised by academic and industry professionals in concert and promotes a high level of interaction between students and industry professionals. As the name of the method implies, students are immersed in the industry environment and tasked to excel in matters of high relevance to the company in which the training takes place. Students must adapt quickly to the new environment, create a professional network on site, become knowledgeable about the topic of study, employ innovative thinking, and meet or exceed expectations in their deliverables in a timely manner in order to succeed.

The industry immersion method has been received with enthusiasm among students and both university and industry leaders. It provides a means for the students to graduate with an industry-relevant education, and the university to provide industry with a better prepared, industry-ready workforce while simultaneously creating important university-industry networks and empowering employers to participate in curriculum design.

In an attempt to disseminate the method to a larger audience, employer alliance building and the industry immersion method are described in detail in this book, and seven industry projects, the so-called "case studies", have been compiled and transposed to a format useful in both industry and classroom settings. Each of these sample industry case studies focuses on a particular trend and together they provide a nonexhaustive view into selected, timely topics. The logistics of teaching by immersion are outlined and a variety of parameters can be customized to match the environment in which they are taught. By consolidating these examples of industry case studies in this book, I encourage their "re-use" while simultaneously hoping to inspire the creation of many new case studies and much new collaboration between universities and industry.

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I am greatly indebted to the many industry professionals who have volunteered their time, expertise, effort, and enthusiasm to help me establish industry immersion learning at North Carolina State University. I am also grateful to the many students who bravely embraced the industry case studies and industry immersion education, displayed immense personal and professional growth, and commenced exciting careers with a skills set aligned with employers' needs.

The generosity of the North Carolina Biotechnology Center made this publication possible.

Raleigh, December 2008

L. Borbye

Disclaimer

The content of this book is based on the individual authors' personal knowledge and experiences. This book presents selected topics in the biotechnology and pharmaceutical industries. Mentioned laws, regulations, and guidelines are based on current status at the time of the authors' experience or writing. Each author is solely responsible for the content of his or her own chapter. The authors and editor disclaim any liability or loss in connection with use of the information herein. Use of the information is at own risk.

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1

Principles of Industry Immersion Learning

Lisbeth Borbye

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Abbreviations

GMP = Good Manufacturing Practice

cGMP = current Good Manufacturing Practice

GLP = Good Laboratory Practice
CEO = Chief Executive Officer

CEO = Chief Executive Officer

FDA = Food and Drug Administration

SWOT = Strengths, Weaknesses, Opportunities, Threats

1.1 Introduction

Traditionally, universities have produced the same kind of employees for both academic and industry work environments. The industry work environment has changed dramatically during the last two decades and the skill set needed in industry today is very different from the one needed in academia. It includes a high level of technical aptitude, multiple professional competencies, an interdisciplinary, highly flexible, and collaborative attitude, and a globally oriented perspective.

Coming from a traditional university training, graduating students face a highly challenging work environment when they enter industry careers. The university education is typically acquired through content-oriented classroom lectures and hands-on laboratory work. It promotes the students' analytical and individual skill sets and their ability to compete. Students gain a sharply defined amount of understanding in discrete topics, often in a nonintegrative manner. Industry needs a workforce with skills that both include the academic background and extend it. Prospective employees need to learn about industry-relevant topics, to understand and be able to operate in a context-oriented manner, to think innovatively, and to develop and utilize good communication and interpersonal skills through teamwork and networking.

As a response to this need, universities in the United States and elsewhere are showing interest in need-based curricula and a concept called "professional Master's education". The goal is to tailor professional graduate education to meet employers' needs. These degree programs focus on developing employer-relevant education, primarily by including new topics and often multi- and/or interdisciplinary training in their curricula. The programs vary in their levels of interaction with industry. An example of this type of program which employs multifaceted interaction with many industry professionals in the Research Triangle Park, North Carolina, is the professional Master's program in Microbial Biotechnology at North Carolina State University. This program integrates academic and professional training in both business and science. Students learn work-force-related skills through industry internships, via industry mentors, and in a new course entitled "Industry Case Studies". This course is interdisciplinary and encompasses a variety of business and science initiatives. The Industry Case Studies course serendipitously utilizes components of action-based learn-