Identifying Best Practices of Logistics & Transportation Graduate Education

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Abstract

Logistics and transportation has become one of the last frontiers that still remain to be conquered by most businesses in the twenty first century. Yet this cannot be done unless all logistics and transportation professionals, irrespective of their functional orientation and current job responsibilities, fundamentally understand the dynamics of how products move from one place to another. This is one of the disciplines that is growing at a faster pace. The issue is that the number of graduates in this field is not meeting the current industry demand. Many U.S. institutions have recently developed and planning to develop educational degree programs in this area. This research analyzed the need for best practices and identified best practices in logistics and transportation education.

The term "Best Practice" has been used to describe "what works" best in a particular situation or environment. Best practices are an inherent part of education that exemplifies the connection and relevance identified in educational research. They interject rigor into the curriculum by developing thinking and problem-solving skills through integration and active learning. Best practices are applicable to all degree levels and provide the building blocks for instruction. Best practices motivate, engage and prompt students to learn and achieve. Students who receive a balanced curriculum and possess the knowledge, skills and abilities to transfer and connect ideas and concepts across disciplines are most likely succeed in their careers. We recently have launched a graduate program in Logistics, Trade and Transportation at our university. We found some practices that are really effective in building curriculum, program delivery, and program improvement. This paper shares those best practices in logistics and transportation education in the US.

Defining best practices

A best practice is a strategy or method that has reliably demonstrated results better than those attained with different means, and that is utilized as a benchmark. Likewise, a "best" practice can develop to wind up better as upgrades are found. It is also considered as a business popular expression, used to depict the methodology of creating and after a standard method for doing things that various associations can utilize. Best practices are inherent part of education that represents the association and importance distinguished in instructive examination. They add special features into the educational module by creating speculation and critical thinking abilities through joining and dynamic learning [1].

Grover J. Whitehurst, as assistant secretary for Educational Research and Improvement at the U.S. Department of Education, defined evidence-based education as "the integration of professional wisdom with the best available empirical evidence in making decisions about how to deliver instruction." [2]. Thomas L. Friedman, author of The World Is Flat, refers "to a twenty-first century world that will be very different from the one in which we were educated. To survive in a new, globally competitive world, today's children will need creativity, problem-solving abilities, a passion for learning, a dedicated work ethic and lifelong learning opportunities. Students can develop these abilities through instruction based on Best Practice teaching strategies." [2].

Best practice in graduate instruction focuses on dependable collaborations between graduate understudies and workforce, underpinned by staff [3]. Best practices are not always the best depending on timing and locations. According to DiBella (2001), "a practice that is valued in one setting will be valued differently in another setting where there are different constraints, limitations, and circumstances". DiBella (2001) advises that "how we learn and what we learn must shift as the context for learning changes" [4]. Draves (1997) concurs and adds that there are no best teaching techniques, only variety and experimentation as the primary tools of one's trade [5].

Methodology to identify best practices

In order to identify the best practices for logistics & transportation education which is a multi-disciplinary area, first we looked over the universities list in the US both under engineering and business schools. By no means, the list of the universities that offer logistics & transportation program are comprehensive. We simply analyzed their practices of developing and managing their programs. Most of these universities follow some guidelines for keeping their university at the top. Those guidelines are nothing but the best practices. In every university website under engineering & business departments we can find some criteria that keeps that program as the best one. By noting all such criteria (program value to stakeholders, program competencies, learning outcomes, flexibility in offerings, etc.) we have analyzed and organized best practices into four groups i.e., Program Content, Program Delivery, Experimental and Active Learning, and Career Placement. Following sections briefly describes the best practices followed by the US universities that offer master program in logistics & transportation related disciplines.

Organizing best practices

1) Program content
- Clearly Stated Program Requirement: Effective learning process is a method in which teachers/professors designs learning opportunities that allow students to participate in empowering activities in which they understand that learning is a process and mistakes are a natural part of the learning.
- Well-rounded curriculum: An *comprehensive curriculum* emphasizes the competencies that must be present within graduates and needed to perform the job. A well-rounded

curriculum is based on the feedback from variety of stakeholders. It integrates real life experiences into the general classroom.

- Up-to-date and effective course content:
  - ➢ Uses multiple methods to systematically gather data about student understanding and ability
  - ➢ Uses student work/data, observations of instruction, assignments and interactions with colleagues to reflect on and improve teaching practice
  - ➢ effectively allocates time for students to engage in hands-on experiences, discuss and process content and make meaningful connections
  - ➢ Highly educated professors who continuously up-to-date the course content.
- Well integrated research: Activities linked to research and scholarships. Some research are basic and some are applied where students can tie their theories with practice. The importance of networking outside the lab, outside the subfield, outside the department, etc. in the program makes the student a successive learner and possesses the abilities to analyze the work environment.
- Continuous improvement of program: Allowing students to explore their experiences, challenge current beliefs, and develop new practices and understandings. Learning will be more effective when prior experience and knowledge are recognized and built on. Evaluation, reflection, and feedback are integral parts of the academic process. These items should be a regular part of every graduate program.

2.) Program delivery

- Contextualized Teaching: A good curriculum of the program and some instructions that have to be followed for keeping the proposed curriculum as the best. Designing and teaching an engaging, contextualized and inclusive curriculum.

- Highly Professional Faculty who deliver well prepared lectures, uses effective tools and technology to deliver course content and continually improve teaching methods & styles based on students' feedback.

- Effective teaching: Introducing multiple teaching methods and modes of instruction (visual, auditory, kinesthetic, and read/write) can make the students to enhance effective learning.

- True assessment of students learning outcomes: Students are encouraged to take responsibility for their own learning, so that they are more likely to develop higher-order thinking skills such as analysis, synthesis, and evaluation.

- Supportive educational environment: Because of appropriate use of information and communication technologies that have been applied in the program increases the independent learning skills of the students. Students should relevant their studies to professional, disciplinary and/or personal contexts. Demonstrate a repertoire of differentiated instructional strategies for assessment and grouping.

3.) Experimental and Active learning

Experiential learning integrates the classroom and the real world. Experiential learning is a process through which students develop knowledge, skills, and values from direct experiences outside a traditional academic setting. Experiential learning encompasses a variety of activities including internships, service learning, undergraduate research, study

abroad, and other creative and professional work experiences. Well-planned, supervised and assessed experiential learning programs can stimulate academic inquiry by promoting interdisciplinary learning, civic engagement, career development, cultural awareness, leadership, and other professional and intellectual skills. There are numerous experiential learning opportunities in higher education that can be found in most disciplines. The following is a comprehensive list of these experiences as noted by (George Mason University, 2011; Loretto, 2011; Northern Illinois University OTC, 2011), Northeastern University, University of Colorado Denver, and many others [6-15].

Classroom Learning Experiences, where students apply their knowledge to challenges in the office or laboratory and then bring that dynamic experience back to the classroom.

Research Experiences provides opportunities for students to do cutting-edge research with faculty who are among the best in their fields - all you need is curiosity, strong work ethic, and the passion for making a positive difference in the world. In logistics and transportation related research, students are exposed to specific tools (TRANS CAD, Trans SIM, etc.), challenges, and interesting findings that are rare in courses.

Apprenticeship Experiences provide students an opportunity to try out a job usually with an experienced professional in the field to act as a mentor. Apprenticeships are a type of on the job training which may lead to certification. Many skilled laborers learn their trade by doing an apprenticeship. Clinical Experiences are hands-on experiences of a pre-determined duration directly tied to an area of study such as nursing students participating in a hospital-

based experience or child development and teacher education students participating in day care and classroom settings.

Cooperative Education Experiences are more extensive than internships and will usually span two or more semesters of work. Co-ops are paid professional work experiences and are tied very closely to the student's academic work. During the co-op experience students will receive ongoing advising and the co-op will be structured to meet the student's academic and/or career goals. Co-op experience usually is included on a student's transcript in addition to being awarded designated credit hours for its completion.

Fellowship Experiences provide tuition or aid to support the training of students for a period of time, usually between 6 months to one year. They are usually made by educational institutions, corporations, or foundations to assist individuals pursuing a course of study or research. Post-graduate fellowships assist students at the graduate level while post-doctorate fellowships provide monies for those who have already achieved their doctorate degree.

Field Work Experiences allow students to explore and apply content learned in the classroom in a specified field experience away from the classroom. Field work experiences bridge educational experiences with an outside community which can range from neighborhoods and schools to logistical sites (Panama Canal, Warehousing facilities, Ports & Airports, Logistics Hubs, etc.) and laboratory settings.

Internship Experiences are job-related and provide students and job changers with an opportunity to test the waters in a career field and also gain some valuable work experience. Internships can be for credit, not for credit, paid or unpaid.

Practicum Experiences are often a required component of a course of study and place students in a supervised and often paid situation. Students develop competencies and apply previously studied theory and content such as school library media students working in a high school library or marketing majors working in a marketing research firm. Practicum experiences also allow students to design and develop a project in which they apply knowledge and develop skills such as a doctoral student preparing the components of an online course.

Service Learning Experiences are distinguished by being mutually beneficial for both student and community. Service learning is growing rapidly and is considered a part of experiential education by its very nature of learning, performing a job within the community, and serious reflection by the student. Service learning involves solving some of society's issues; such as, homelessness, poverty, lack of quality education, pollution, etc. One of the goals of service learning is to help students become aware of these issues and develop good citizenship in learning how to help solve some of these problems.

Student Teaching Experiences provides student candidates with an opportunity to put into practice the knowledge and skills he or she has been developing in the preparation program. Student teaching typically involves an on-site experience in a partner school and opportunities for formal and informal candidate reflection on their teaching experience.

Study Abroad Experiences offer students a unique opportunity to learn in another culture, within the security of a host family and a host institution carefully chosen to allow the transfer of credit to a student's degree program. Students studying a study abroad program really understand how global supply chain works.

Volunteer Experiences allow students to serve in a community primarily because they choose to do so. Many serve through a non-profit organization – sometimes referred to as formal volunteering, but a significant number also serve less formally, either individually or as part of a group. Because these informal volunteers are much harder to identify, they may not be included in research and statistics on volunteering.

Professional Mentorship Experiences allow students to receive mentorship services from industry professionals of their disciplines. In this program students are matched with potential professional members based on common characteristics. This unique experience helps students with job searches, resume preparations, handling job pressures, and other real life challenges.

Professional Networking Experiences provides students to network with industry and academic professionals to get clear understanding of the expectations from employers. This can be done through conference participation, professional meetings, student organization activities, etc.

Other Experiential Learning Experiences There are lot more experiences that can help students in learning and relating their learning with real world. Some of these are facilities tour, competition - case

4.) Career services and graduate placement

- Targeted Marketing: Focusing on targeted marketing improves student engagement with institutional resources. Studies have indicated that a variety of strategies—namely, focus

groups and surveys—are effective in identifying and defining graduate students, as well as their specific needs and preferred resources.

- Innovation through Technology: University websites are often an information-rich portal for students, employers, faculty/staff, parents and alumni. Most sites offer targeted pages for each of these groups. Websites also offer a medium for delivering career services—indeed, web based resources are increasingly used as an alternative to physical locations.

- Career Courses and Workshops: Semester courses offer students the option to earn credit while developing career related knowledge. By providing these services through a semester class, however, graduate students can provide more in-depth and targeted information, while also ensuring active participation. Workshops may include mock interviews, etiquette dinners, employer meet-and-greets, networking seminars, and group interview workshops. Many workshops include students, employers and faculty, in order to provide peer and professional critiques as well as networking opportunities. Mock interviews provide students a stress-free opportunity to practice and develop interview skills. Interviews are typically conducted between students and career counselors. This "test-run" helps students assess their strengths and weaknesses in a no-pressure environment.

- Career Fairs: Career fairs offer students and employers the opportunity to develop networks and gain knowledge of available job opportunities. They seek out partnerships with institutions in their area to create collaborative career fairs, attracting greater numbers of employers.

We tried our best to identify the most US 4 universities (4 years) that offer master or higher degrees in logistics & transportation and very closely related areas. Following table shows the list of all of those US institutions.

Table 1: List of US Universities offering Masters in Logistics and Transportation, Departments

and Courses Information

University name	Department name/department link	Logistics and transportation courses
1.American military university(AMU)	http://www.amu.apus.edu/academic/programs/school/amubus/business School of Business	1.Transportation and Logistics Management-Capstone Option (Capstone) 2. Logistics Management (Grad Cert)
2.University of North Texas	http://www.unt.edu/majors/ubusiness.htm College of Business	1. Acquisition logistics and life cycle management 2.Traffic and transportation management
3.American public university	http://www.apu.apus.edu/lp2/school/business/index.htm School of Business	1. Transportation and Logistics Management.
4.North Western University Transportation Center	http://www.transportation.northwestern.edu/education/graduate.html Civil Engineering	1. Transportation Economics and Public Policy 2. Transportation Systems Planning and Management. 3. Production and Logistics I
5.University of Washington	http://www.supply-chain-transportation.uw.edu/ Civil and Environmental Engineering	1. Logistics and Analysis 2. IT Systems and Supply Chain Integration.
6.North Dakota State University	http://bulletin.ndsu.edu/graduate/programs/ Civil Engineering	1. Transportation and Logistics. 2. Transportation Option
7.University of Wisconsin	https://www.uwsuper.edu/acaddept/dbe/index.cfm Business and Economics department	1. Transportation and Logistics Management
8.Bellevue University	http://www.bellevue.edu/degrees/index.aspx?mast=1 Master of Business Administration	1. Introduction to Supply chain and Logistics Management 2. Foundations of Supply Chain Communication.
9.University of North Florida	http://www.unf.edu/catalog/colleges/ccec/Construction_Management/ Construction Management	1. Department of Marketing & Logistics 2. Transportation & Logistics Major

10.California state university	http://www.csudh.edu/ee/programs.html Business education	1. Introduction to Logistics 2. HAZMAT Transportation 3. Global Logistics
11. Massachusetts Institute of Technology (MIT)	http://student.mit.edu/catalog/m1a.html http://ocw.mit.edu/courses/transportation-courses/ Transportation Courses	1. Transportation analysis and planning methods 2.Transporatation management 3. Transportation logistics
12. Rotterdam University	http://www.rotterdamuas.com/programmes Civil Engineering	1. Transport Management System
13.George Mason University	http://masononline.gmu.edu/programs/ School of Policy, Government and International affairs	1. Transportation and Logistics Policy
14.Texas A&M Galveston	http://www.fit.edu/programs/8408/ MS-Transportation Management	**1.** Logistics Management
15.Penn State	http://harrisburg.psu.edu/ce/all-programs.php Business and workforce development	**1.** Business Logistics Management **2.** Transport Systems
16.Florida Institute of technology	http://www.fit.edu/programs/8322/ms-logistics-management logistics-management	1. Management of Transportation Systems 2. Traffic Management 3. Transportation Management
17.University of Memphis	http://www.memphis.edu/ugcatalog/collegeprog/index.php Department of Civil engineering	1. Transportation Systems Eng. 2. Traffic Engineering
18.Auburn University	http://www.auburn.edu/academic/cosam//departments/index.htm Civil Engineering	**1.** Logistics and Supply Chain Management
19.Louisiana state University	http://catalog.lsu.edu/content.php?catoid=2&navoid=198#Graduate_Degrees Business administration	1. Logistics resource optimization 2.Supply chain logistics
20.University of Florida	http://gradcatalog.ufl.edu/content.php?catoid=2&navoid=839 Business administration	1. Advanced Urban Transportation Planning 2. Geometric Design of Transportation Facilities 3. Computational Methods in Transportation Engineering

21.Texas Southern University	http://www.tsu.edu/academics/colleges__schools/The_Graduate_School/Degree_Listing/default.php Master of Science in transportation planning and management	1. Transportation Planning and Management.
22.University of Alabama-Huntsville	https://gradsystem.aa.ua.edu/admin/programs.aspx?type=eg Civil engineering	1. Transportation systems engineering
23.University of Alabama-Tuscaloosa	http://courseleaf.ua.edu/engineering/ Department of civil, construction and environmental engineering	1. Intro. to Transportation Eng.
24.Georgia College and State University	http://graduate.gcsu.edu/ College of business	1. Logistics Processes & Management 2. Supply Chain Management Strategy 3. Supply Chain/Logistics Leadership
25.Illinois Institute of Technology	http://www.iit.edu/graduate_college/bulletin/ Department of civil and environmental engineering	1. Transportation Engineering 2. Urban Transportation Planning 3. Public Transportation Systems
26.University of Alaska	http://www.uaf.edu/courses/ Civil Engineering	1. Introduction to Transportation Engineering 2. Traffic Engineering 3. Sediment Transport
27.University of Minnesota	https://webapps-prd.oit.umn.edu/courses/designators.jsp?campus=UMNTC Civil Engineering	1. Transportation Engineering 2. Transportation Policy, Planning, and Deployment 3. Transportation Systems Analysis 4. Transportation Data Analysis
28.University of Tennessee-Knoxville	http://catalog.utk.edu/content.php?catoid=1&catoid=1&navoid=104&filter%5Bitem_type%5D=3&filter%5Bonly_active%5D=1&filter%5B3%5D=1&filter%5Bcpage%5D=9#acalog_template_course_filter Civil Engineering	1. Transportation Engineering I 2. Transportation Engineering II
29.Texas A&M University	http://catalog.tamu.edu/09-10_ug_catalog/course_descriptions/index.htm Civil engineering	1. Transportation Engineering

After identifying the best practices, we looked up for the universities that are performing those best practices. Different universities may have same best practices and all the universities may have a similar best practice. Following table shows the mapping of identified universities (table 1) with identified best practices.

Table 2: University mapping best practices

List of best practices for graduate education		Universities which are practicing those best practices
A, Best Practices Related to Program Content		
1.	Clearly stated program requirement	1,2,3,4,7,9,11,12,13,15,16,19,22,23,24,27,29
2.	Well-rounded curriculum	2,3,5,6,7,8,9,13,16,17,22,24,26,28
3.	Up-to-date and effective course content	1,3,5,6,7,10,15,21,23,24,25,27
4.	Well integrated research	1,2,4,5,7,11,15,16,19,20,23,25,26,29
5.	Continuous improvement of program	3,4,7,11,12,14,15,19,22,27
B. Best Practices Related to Program Delivery		
6.	Contextualized teaching	4,5,9,11,12,13,24,25,26,27,29
7.	Highly professional faculty	4,5,8,10,14,17,18,21,25,28
8.	Effective teaching	3,4,5,6,8,11,14,17,19,20,21,23,25,27
9.	True assessment of student learning outcome	2,4,5,8,9,10,11,13,16,17,20,21,4,25,26,28,29
10.	Supportive educational environment	1,3,4,6,7,8,9,12,13,15,16,23,24,27
C. Experimental and Active learning		
11.	Travel support for students	8,17,22,25,28,29
12.	Financial aids	1,2,3,5,6,7,8,10,11,12,13,14,17,18,19,20,22,24,25,26,27,28,29
13.	Pathway programs	3,4,5,7,11,13,14,17,18,21,22,24,27,29
14.	Internship programs	1,2,3,4,6,8,9,12,15,16,17,19,20,21,23,24,25,26,27,28,29
15.	Recent Graduate programs	3,4,7,11,12,15,18,20,23,24,27,29
16.	Entrepreneurship	3,7,11,13,15,16,21,25,27
D. Career services and graduate placement		
17.	Targeted marketing	4,6,7,9,11,15,21,22,26
18.	Innovation through technology	2,3,6,10,11,17,24
19.	Career courses and workshops	1,2,4,6,8,9,12,13,15,16,17,19,22,23,24,28,29
20.	Career fairs	6,8,11,15,16,19,20,23
21.	Mock Interviews	3,5,6,7,10,17,22,23,24,28

Discussions and conclusions

The universities which are following the best practices are likely to excel in their programs. Universities like ours that just started or want to start a program in logistics and transportation related areas do not have to start from scratch if they have access to background research. Based on this research, the best practices are organized into four categories: Program content, Program delivery, Experimental and active learning and Career services &Graduate placement. Among these four categories, different sections are explained and reasons for which they are categorized into best are been concluded. Different universities have different best practices based upon their course structure and environmental conditions. All of them don't follow the same practices because they have some standard regulations on which they develop their best practices. However, it was hard to verify that all these universities simply followed most of the best practices in graduate education.

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