



Doctoral Process Flowcharts: Charting for Success

by Marianne Di Pierro

Business has long understood the value of process flowcharts and has incorporated them into the framework for manufacturing and safety processes. Visual representations of processes promote efficiency by aiding understanding of how processes function. They remove guesswork, permit no assumptions, and heighten communication. When used in a group or team setting, they help to identify problems and areas of confusion, as well as build consensus and commitment.¹ They can promote quality and provide clear, immediate access to information outside of written procedures.

Flowcharts—along with control charts, cause-and-effect diagrams, histograms, check sheets, Pareto charts and scatter diagrams—are considered to be one of the seven tools of quality through which continuous process improvement occurs.² In a *Quality Progress* article, John T. Burr wrote that the construction and use of flowcharts are the most important actions in bringing process control to administrative and manufacturing processes.³

Yet, flowchart use in higher education, particularly among academicians concerned with student retention and recruitment, is underwhelming, and finding synergy between need and application can be challenging. The use of flowcharts, however, may hold great potential as we explore doctoral retention initiatives, conserve resources, and ensure timely graduation through structured methods based on measurement, evaluation, and assessment. Intersecting just-in-time (JIT) training at the points in the process that pose barriers to program completion opens new possibilities for success.

Here is how we use doctoral process flowcharts at Western Michigan University (WMU) and why we think their use is a good idea.

Unmeasured cost of doctoral attrition

Doctoral attrition is not a benign phenomenon; the unbridled loss of an institution's doctoral contingency represents untold economic losses in the form of departmental, institutional, state and federal resources, as well as immeasurable voids in research.⁴ Moreover, research conducted by the Council of Graduate Schools indicates the United States is losing its status as a world leader in the production of doctorates in science and engineering and has suffered losses in its IT stronghold that puts at risk its ability to face the challenges of the 21st century that are contingent on scientific scholarship and research.⁵ These losses are only compounded by the human toll suffered by non-completers.^{6,7}

To date, and to the best of my knowledge, there are no studies that define the total economic cost of attritions that occur in doctoral programs in the sciences, humanities and social sciences. These losses are not only in graduate assistantships and doctoral associateships, but also in the more ambiguous loss of faculty advising time, faculty research time, research rendered via dissertations, the degree itself to the institution and to the student, among others.

Perhaps if universities knew the exact dollar amount reflected in a single attrition, they would more aggressively seek solutions. The far-reaching implications of doctoral attrition are sobering at the very least and give us pause to consider the value of adopting sound business practices, such as the use of flowcharts and the



implementation of JIT training through which continuous process improvement and quality are predicated.

Flowchart applications in higher ed

A flowchart is essentially a picture of any process, whether it is manufacturing, medical, scientific or another area. A process is a series of sequentially ordered, repeatable events that have a beginning and an end, and which result in either a product or a service.⁸

As director of a center dedicated to retaining and graduating doctoral students at WMU, I wanted to flow out the process—create a visual representation (flowchart) of an academic process (discipline-specific doctoral program) by marrying these two strange bedfellows. Ironically, they were ideally suited to each other and could help us identify points in the doctorate educational process that disrupted students' degree progression.

The value appeared obvious. For one, departments could use the flowcharts during recruitment to attract potential students to their discipline. Additionally, they could track enrolled students at each stage of their programs. Moreover, students could discern their own trajectories from program inception to graduation. If students were derailed, the flowchart pointed the direction from the obstacle back to the process, an action that resulted in homeostasis: retention and graduation. In addition, the flowchart alleviated confusion about the timing of required forms. We included live links to relevant forms students required.

In adapting flowcharts to our doctoral programs, I began by considering which departments would be most receptive to using flowcharts. The College of Engineering seemed to be a likely first customer that would immediately recognize the value of this systems approach and would be willing to work with me. Understanding that faculty members are confronted with demanding schedules, I cultivated their cooperation and made the best use of their time by anticipating next steps. Instead of asking departments to draft their own process, we assumed responsibility and accountability for the entire project. I began with the graduate catalog, which contains not only policies and procedures guiding graduate education, but also descriptions for each graduate program.

Frequently, these descriptions are not linear because requirements can be sequenced to occur simultaneously, a fact that made the task formidable. In addition, the catalog sometimes featured information in a circuitous manner. Students might be directed in an earlier section of the narrative to work on the dissertation and later, in another section, would be reminded to complete the comprehensive examinations before working on the dissertation. The problem was that students had to go through the experience to understand where they had come from, without having a roadmap to show them where they were headed.

I converted the narrative description of requirements for each doctoral program to a narrative flowchart that outlined the process using numbered bulleted statements. From the narrative flowchart, we designed the actual flowchart. I provided the departments with preliminary drafts of both charts for review. We asked faculty members whether the information in the flowchart accurately reflected their program, and we implemented changes accordingly until faculty recognized the visual representation in the chart as their process.



I proceeded with the view that the department owned the process and that my job was simply to translate it from its narrative form to its visual form through which all phases of the process, from inception to completion, could be clearly visualized. We implemented changes where necessary until faculty members were satisfied and prepared to sign off on the document, allowing us to post the chart to our website. At this point, we included the name of the individual authorizing approval, as well as the date, on the bottom of each chart. Our task now is to keep the charts updated. This means when curriculum changes are made—a formal process through which departments amend their program requirements or procedures—we ensure the flowcharts reflect corresponding changes.

We have added one element to the charts: time-to-degree (TTD). In our opinion, students should be apprised of how long it will take them to complete their study programs. As principle investigator on a research project that tracks TTD, in addition to other variables related to the doctoral educational process, I measure TTD in three distinct phases:

- Phase I: The time from student admission to the doctoral program to completion of comprehensive exams.
- Phase II: The time from completion of the comprehensive exam to the defense of the dissertation.
- Phase III: The time from the defense of the dissertation to graduation.

This time fits logically within the flowchart sequencing because students and faculty examine the data and understand the timing necessary to move through each of the phases. Data are based on times established for each graduated doctoral student from each program, figures that are then averaged to reveal a profile that tells us what those students look like as they come through the process. In essence, we have a snapshot of each student, as well as a snapshot of the entire program, because the data are collapsed to reflect averages.

JIT: an economic imperative

Hazards in doctoral programs exert negative consequences only if they remain intangible. These include such milestones as completing statistics courses, comprehensive exams, dissertation proposal approval, and dissertation defense. Placed within a visual context, the logical juxtaposition of dangerous crossroads and problematic intersections with ameliorative programs and interventions offers JIT opportunities for successful degree completion. Regaining balance is key. Such measures protect the economic investment in time and energy, for advising faculty and students, by delineating potentially hazardous places in the process that disrupt time to degree—the throughput.

These places represent threats to the process safety and to the travelers embarked on the process—students and faculty, as well as institutions that have committed financial and intellectual resources aligned with degree completion. Jack B. ReVelle writes that the use of the flowchart within the working environment assists us in “develop[ing] a better understanding of process hazards, which, in turn, results in reduced injuries, illnesses and loss of lives.”⁹ Within the academic environment, however, the use of flowcharts helps us to better understand and visualize barriers to doctoral completion. Therefore, we reduce attrition, increase retention and sustain



students and faculty throughout the process via programmatic intervention and one-on-one mentoring and advising.

Currently, we provide our students with access to statistical consultation and online data collection, both of which prepare students for the rigors of dissertation research. In addition, we provide guidance and oversight in the conceptual development of proposals, as well as preparation for comprehensive examinations, the proposal defense, and the dissertation defense. Moreover, we provide conflict resolution. These initiatives ensure wellness by lending to the overall health and well-being of the process and the institution. In addition, such approaches ensure best outcomes: doctoral persistence and timely graduation, as well as the very research in which safe passage to the doctorate is crafted.

Intersections between business principles and doctoral education are logical signposts, congruent in philosophy. The use of doctoral process flowcharts illuminates pathways to the doctorate and ensures opportunities for successful degree completion via quality interventions and process improvement.

Author's note: For an example of flowchart used in the doctorate program out of the Mallinson Institute for Science Education at Western Michigan University, visit www.wmich.edu/grad/Grad_Ctr_Research_Retention/Science_Ed.pdf (case sensitive). The author acknowledges Julien Kouame's contributions to the flowcharts.

References

1. HCl Consulting, "Flowcharting: Mastering the Details," www.hci.com.au/hcisite2/toolkit/flowchar.htm.
2. John T. Burr, "The Tools of Quality: Going with the Flow(chart)," *Quality Progress*, June 1990, pp. 64-67.
3. Ibid.
4. C.M. Golde, "The Role of the Department and Discipline in Doctoral Student Attrition: Lessons from Four Departments," *The Journal of Higher Education*, Vol. 76, No. 6, 2005, pp. 669-700.
5. Council of Graduate Schools, NDEA 21 CGS Task Force, "NDEA 21: A Renewed Commitment to Graduate Education," white paper, revised October 2005, www.cgsnet.org/portals/0/pdf/NDEA21RevNov05.pdf (case sensitive).
6. Patricia Hinchey and Isabel Kimmel, *The Graduate Grind: A Critical Look at Graduate Education*, Falmer Press, 2000.
7. Barbara E. Lovitts, *Leaving the Ivory Tower: The Causes and Consequences of Departure From Doctoral Study*, Rowman & Littlefield, 2001.
8. Jack B. ReVelle, "Safety Process Analysis," *Professional Safety*, July 1, 2003.
9. Ibid.

Marianne Di Pierro is director of the Graduate Center for Research and Retention at Western Michigan University (WMU). She holds a doctorate in English from the University of South Florida. Di Pierro conducts research on graduate education and participates in several national research projects centered in developing best practices in graduate education. Among her other responsibilities, she serves as a conflict resolution strategist for graduate students and graduate faculty at WMU. She can be reached at marianne.dipierro@wmich.edu.

ASQ Higher Education Brief June 2010

www.asq.org