Assessment of an Innovative Masters Program

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Context

Purdue University houses one of the nation's largest Schools of Technology. Over 5000 students are served by more than 180 full time faculty organized into eight separate departments deployed over one home site (West Lafayette) and eleven statewide locations. Notably, and rather than having individual departments each mount their own graduate program; to insure critical mass, consistency and quality; Purdue's School of Technology opted for a single graduate administration that spans each department and statewide site. Headed by an assistant dean for graduate studies this administration, in collaboration with departmental graduate committees, operates three distinct graduate degrees: A Ph.D. program (in collaboration with the School of Education), a Master of Science in Technology, and a Weekend Masters Degree Program. This article focuses on the design, initial findings, and assessment of the latter program.

Weekend Masters Program

The School of Technology's Weekend Masters Degree program (Depew, Dunlap, & Newton, 2001) is an innovative, technology-focused, adaptation of successful executive masters programs typically offered by leading business schools. The Weekend Masters Degree Program in Technology is designed for full-time professionals. The objectives of the program are: (a) enhancement of participants' learning skills in a continuously changing technology field, (b) enhancement of analytical and problem-solving skills in applications of technology, and (c) accentuation of professional ethics and awareness in a technological environment. Purdue's adaptation involves offering a series of twelve courses, delivered via fourteen very intense three-day weekend sessions which are augmented with a carefully developed set of out-of-class assignments and a communication support system. Each of these weekend sessions entails 24 contact hours of meeting time. In addition, a directed project is required to demonstrate research and/or development competence. All together, the activities span a five-semester period. Considerable homework is also required between meetings and ongoing contact is facilitated via electronic communication. Electronic communication is, in fact, only part of the innovative instructional methodology incorporated into the Weekend Masters Degree program. The methodological approach, which has previously been documented (Newton, Sutton, & Dunlap, 2000), is based on highly structured, intense, and electronically supported learning activities all guided by an actively involved, physically present, faculty cohort. Extensive intra-cohort interaction is also ongoing.

This highlights another key feature of the School of Technology's Weekend Masters Degree Program, namely that it is based on cohorts. A student cohort is enrolled and progresses through in step until graduation. This student cohort is guided and taught by a matching faculty cohort. Currently four faculty-student cohorts have/are operated/operating and admissions for a fifth are in process. Students in each cohort come from many different states and they are typically sponsored by their employers. A minimum of three years of significant business, industry, or government experience is required to become eligible for admission into this graduate program and documentation of this substitutes for the typically required GRE or GMAT score. In addition, all of the School's other graduate admission criteria, e.g., 3.0 minimum GPA; must be met.

Evaluation Design

The evaluation plan for the Weekend Masters Degree Program (WMP) is based on a synthesis of two powerful evaluation models, namely the Context-Input-Process-Product (CIPP) by Stufflebeam (2000) and 360° evaluation. Key principles from each model served to shape the evaluative design evolved by the authors and overviewed in Figure 1. Additionally, because multiple cohorts existed, and because they formed an overlapping time series, the evaluation design incorporated some distinguishing longitudinal features as well as both formative and summative characteristics. Finally, given the absence of standardized or even well established instruments with appropriate scaling properties, the researchers developed several purpose-built instruments and employed qualitative approaches as well as making extensive use of extant data.

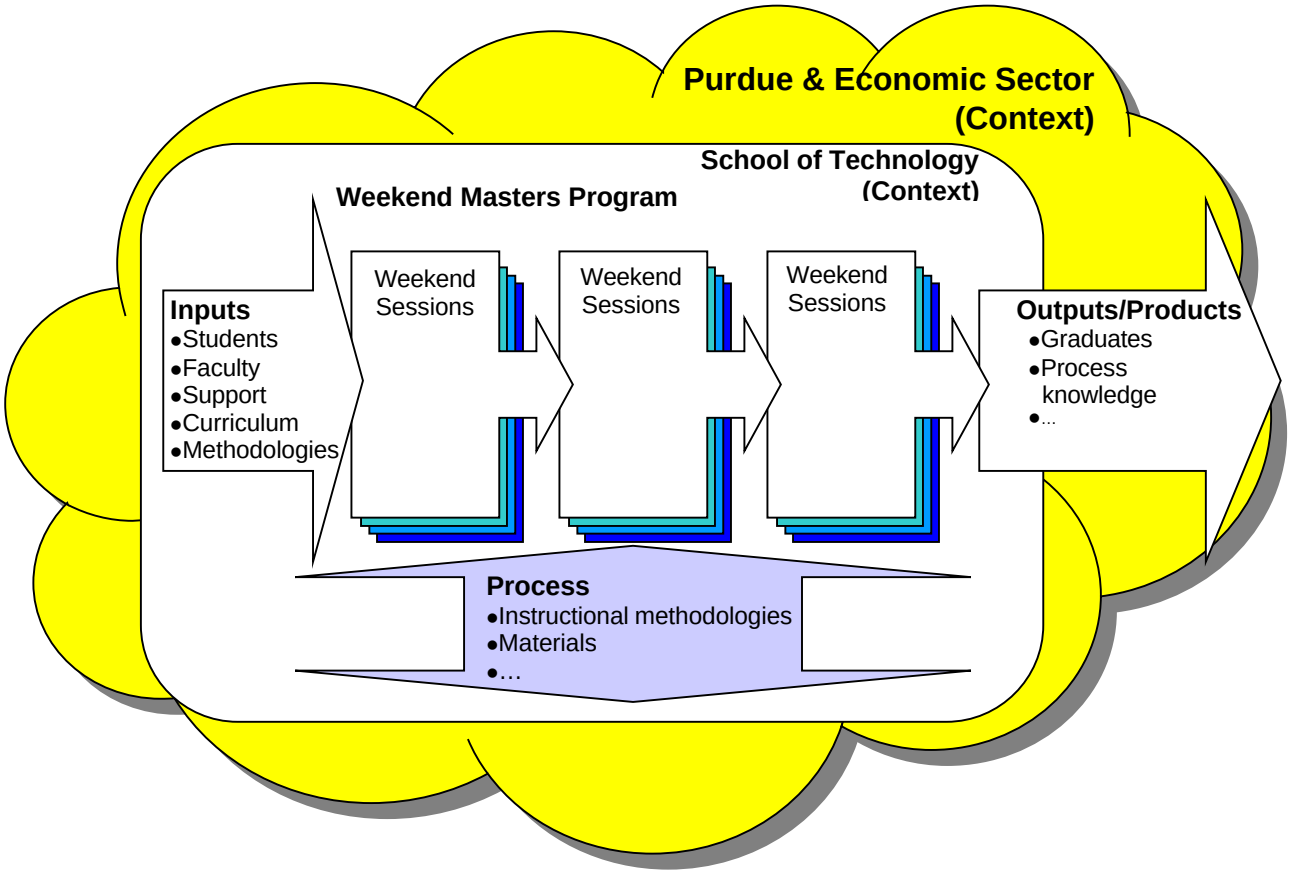

Figure 1. The CIPP-based Weekend Masters Degree program evaluation design

The foci for the assessment of the Weekend Masters Program include the following:

1. Formative assessment to evolve an even stronger program for future cohorts,
2. Summative assessment of the experience of the first two cohorts, and
3. A research oriented investigation into the progression of the enrolled participants and the consequences of their participation.

Instrumentation & Data Collection

Within these three foci, the evaluation design, shown in Figure 2, calls for assessment of:

- Satisfaction (overall) with the program
- The program's instructional methodology
- Effectiveness of the program's mechanics (registration, fees)
- Perceptions of value received
- Appropriateness of content mix (technology, management, soft skills, communication, and research)
- Technological literacy
- Written communication
- Post-participation career advancement
- Employer perceptions of performance change

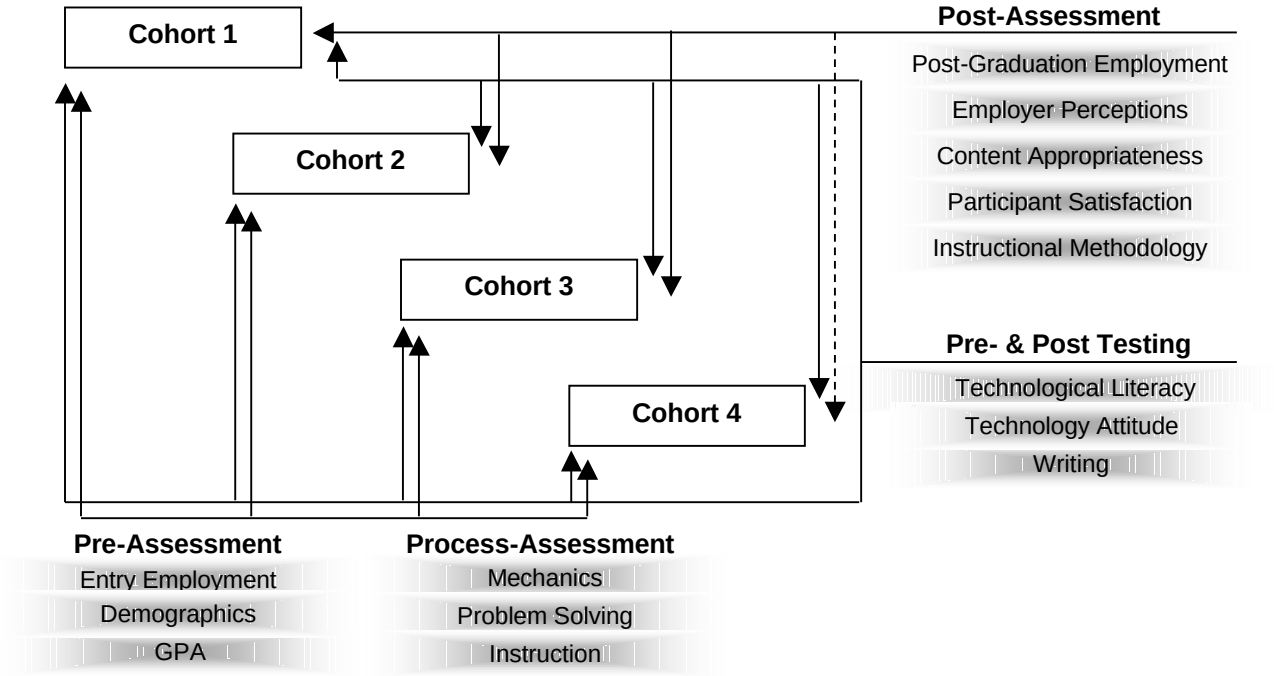

Figure 2. Assessment measures

Instrumentation consisted of research team prepared devices for each of these variables except for technological literacy. That variable will be assessed by a previously used instrument developed by one of this article's authors (Dyrenfurth, 1990). In addition, several evaluative

variables consisted of data secured from the students' application and routine academic records, e.g., age, gender, transcripts, etc.

Findings and Discussion

At this time, the evaluation is well underway but yet unfinished. The following data highlight what has been observed so far but numerous additional collections and analyses are already designed into the evaluation. The collected data are presented in Tables 1 – 4 and constitute an evaluative baseline for this program.

Each student who applied for admission to the Weekend Masters Degree Program submitted a *Statement of Purpose* as a part of his or her application for admission. Students identified the following as reasons for pursuing the program. Notably they were quite consistent with the designers' intent.

- Self-improvement, challenge of learning, and a sense of accomplishment
- Career advancement and professional development
- Relevance of the program to current job or career goals
- Program delivery format, flexibility that accommodates both professional and family responsibilities
- Expand alternative career opportunities
- Purdue's experience, reputation and that of the faculty of the School of Technology
- Learn and further knowledge related to manufacturing
- Understand use and application of technology, and immediate applicability of gained knowledge in the current job
- Opportunity to share ideas/experience with the members in the cohort
- Build teamwork skills

Table 1 presents much of the evaluative baseline in the form of demographic data. To the extent possible, it also presents effectiveness data that show 84.4% of the participants graduating on time and a minimal rate of withdrawals and late graduation.

Many students indicated that they learned about the program from a colleague or individual who has either completed the program or is currently enrolled in a different cohort group. The authors consider the ongoing participation of employees from same company in subsequent cohort groups as evidence of the graduates' satisfaction with the program. Table 3 shows that a total of 30 employees (66.7% of those possible) represent repeat corporate participation. Participants also reported (Table 2) considerable employer support for their involvement with the weekend Masters Program.

For most students, the program met their expectations and enhanced their learning skills considerably (Table 2). These were the highest ratings in fact. The authors interpret these results in terms of delivery format, communication with faculty, and knowledge gained. Most participants responding to the survey also indicated (Table 2) substantial enhancement of their technological knowledge but a lesser degree of strengthening of technological problem solving skills. Awareness of professional ethics, however, was only modestly enhanced. The program's emphasis on technology management more than on any specific technology could also explain some of these results.

Table 2 also highlights that career advancement was not yet a consequence of participation for the in-process participants but that is to be expected since the two cohorts for which this data was requested in an evaluative mode, have not graduated yet. Probably because of this, some participants chose to rate this question N/A as indicated on the table. Table 1 triangulates these findings with data secured from participant reports of actual job titles. This reveals that approximately 40% of all participants (graduated and in-process) demonstrated an apparent increase in title or responsibility. Since not all of these respondents have graduated yet, it is likely that this percentage will increase somewhat when that occurs.

Overall, it is important to note the respondents' considerable satisfaction (Table 2) in reporting that the Weekend Masters Program met their expectations. Since a major goal, for both the participants and the designers, was to enhance knowledge and skills in a way that they could be immediately applied to the work setting, the candidates' directed projects were carefully reviewed. The titles of these are presented in Table 4. Examination of these demonstrates that the applied nature of the program is effectively executed.

Summary and Conclusions

Purdue University's School of Technology offers a Weekend Masters Degree program to serve technology professionals working in industry and/or business on a full-time basis. The program, based on cohort groups, is in its fourth year. A total of 27 students have graduated from two cohort groups. Graduates have reported satisfaction with the program and indicated that it met their expectations. Also, repeat participation of employees from various companies indicates both employer and employee satisfaction with the program. Required directed project work allowed participants to apply enhanced knowledge and skills at their workplace. This demonstrated that one of the program objectives, the applied nature of the program, is being met. About 30 percent of the graduates experienced career growth after graduation, as indicated by their increased job title. Currently enrolled participants indicated a significant enhancement of learning skills and a substantial increase of technological knowledge, but a lesser degree of enhancement of technological problem-solving skills. The researchers concluded that the program is suitable effective to merit continuation and refinement.

The evaluation of this program is an ongoing process and the authors are adding further dimensions to it pursuant to the plans outlined in this article. To yield a longitudinal picture, the next steps will involve a detailed follow-up of the graduates as well as benchmarking their performance on a series of measures such as technological literacy. Current cohorts are also being assessed in this manner.

Table 1. Evaluation baseline data

Data Element	Cohort				Overall Average
	One	Two	Three	Four	
Cohort Details					
Start Date	1998 Fall	1999 Fall	2001 Sp	2001 Fall	
Scheduled Graduation Date	2000 Sp	2001 Sp	2002 Su	2003 Sp	
Number of students starting	22	22	22	16	82/4
Male/Female Ratio	21/1	19/3	19/3	12/4	71/11
Average Age	36.8	37.9	37.2	33.56	36.1
Baccalaureate Exit GPA	3.23	3.4	3.06	3.09	3.265
First degree completed (yrs before enrolling in WMP)	10.4	8.36	9.36	7.06	8.728
Number with Business first degrees/cohort	5/22 23%	5/22 23%	5/22 23%	4/16 25%	15/60 25%
Number with Technology/ Engineering first degrees/cohort	6/22 27%	16/22 73%	14/22 64%	10/16 63%	29/60 48.3%
Percent from Manufacturing/cohort	18/22 82%	16/22 73%	18/22 82%	10/16 63%	38/60 63.3%
Work experience (yrs)	10.05	9.23	9.27	6.69	9.167
Number of different companies represented	7	14	11	12	9
Number of states represented	2 IN, WI	4 IN, IL, OH, IA	5 IN, MI, TN, UT, OH	3 IN, OH, WI	
Number paid by employer	0	3	2	3	8
Effectiveness					
Number graduating on time (% total graduates)	15/17 88.24%	12/15 80%	TBD	TDB	27/32* 84.4%
Number graduating one or more semesters late	2/17 11.8%	1/15** 6.7%	TBD	TBD	3/32* 9.4%
Number of withdrawals	5 29.4%	7 31.8%	3* 13.6%	6* 37.5%	21/82* 25.6%
Number of students with title increase	5/17 29.4%	4/15 26.7%	9/19* 47.4%	6/10* 60%	24/61* 39.9%
Number of students with no title change	4/17 23.5%	7/15 46.7%	3/19* 15.8%	2/10* 20%	16/61* 26.2%
Number of students with unknown title situation	8/17 47%	4/15 26.7%	8/19* 42.1%	3/10* 30%	23/61* 37.7%

TBD = Data yet to be collected when in-process cohorts graduate.
* = Existing data that is subject to change upon program completion.
** = Two scheduled to graduate Summer 2002.

Table 2. Participant assessment of goal attainment

Item	Cohort 3 Average assessment N=19	Cohort 4 Average assessment N=7	Combined Average N=26
1. Looking back, to what extent did/has the weekend masters program meet/met your expectations	1.737	2.143	1.940
2. To what extent was/is your employer supportive of your participation in the weekend masters program?	2.263	2.000	2.132
3. What has been your career advancement since graduation (e.g., a higher level position, a better employer, increased professional opportunities, increased job responsibilities, increased salary)?	0.500 N = 11	1.250 N = 4	0.875
4. To what extent has your participation in the program enhanced your technological problem solving skills	1.368	1.714	1.541
5. To what extent has your participation in the program enhanced your learning skills (e.g., learning to learn, accessing information, synthesizing information, analyzing information, interpreting/decision making)	1.842	2.714	2.278
6. To what extent has your participation in the program enhanced your awareness of professional ethics and the issues associated with them?	1.368	1.286	1.327
7. To what extent has your participation in the program enhanced your technological knowledge and capability?	1.605	2.143	1.874

Note: Cohort 2002 is in 4th semester Cohort 2003 is in 2nd semester

Response weighting: Not at all = 0, Somewhat = 1 Considerably = 2, A great deal = 3

Table 3. Recurring enrollee/enterprise pattern

Cohort 1	Cohort 2	Cohort 3	Cohort 4
Enterprise A.... 10	Enterprise A..... 2	Enterprise A 4	Enterprise A 1
Enterprise B 1		Enterprise B 1	
Enterprise C 1	Enterprise C 3	Enterprise C 5	Enterprise C.....1
	Enterprise D 1		Enterprise D 1
	Enterprise E 3		Enterprise E.....1
	Enterprise F..... 1	Enterprise F.....4	
		Enterprise G 1	Enterprise G 1
Student Total = 12	Recurring Enterprise Student Total = 10	Recurring Enterprise Student Total = 15	Recurring Enterprise Student Total = 5
	10/14 repeats 71.4%	15/20 repeats 75%	5/11 repeats 45.5%
			Total 30/45 possible repeats 66.7%

Table 4. Directed project titles of Weekend Masters Program graduates

Date	Directed Project Title
2000, March	Measuring Forecast Accuracy
2000, March	Development of a Facial Recognition Internet Web Site
2000, March	Utilizing AIDC to Report Labor and Track WIP
2000, March	The Implementation of High-Performance Work Teams in a Manufacturing Environment
2000, March	Special Engineering Request Tracking System
2000, March	Caterpillar CNC Machine Selection and Test
2000, March	Quest for Quality: Compliance to QS-9000
2000, March	A Study to Reduce Shipping Errors Using AIDC
2000, March	Utilizing Hand Held Data Collection Terminals to Check Out Worked Parts
2000, March	3500 Block Line Work-In-Process Tracking: An AIDC Technology Justification
2000, March	IT Organizational Effectiveness Instrument
2000, March	Implementing an on-line Product Marketing System Tool
2000, March	Utilizing Web-based Information Technology for Dispersing Assembly Instructions to the Shop Floor
2000, March	Process Data Integration and Inventory Control
2000, April	Control of Thermal Error in Precision Machining
2000, June	Comparing the Technical Performance and Cost of Low Temperature Co-Fired Ceramic Substrates with Ceramic Thick-Film Substrates
2001, February	Hard Disk Drive Head Alignment Analysis
2001, February	Designing and Implementing Quality of Service Rules in a Wide Area Network
2001, February	Creating An E-Commerce Website
2001, February	Problem Solving for General Ledger
2001, February	Spline Rolling Process
2001, February	The Benefits of a Vertical Carousel Implementation
2001, February	Software Engineering for Automation and Controls Engineers: A Web-based Instructional Supplement to EET 302
2001, February	Distribution of Information Via Instructor-led, Computer-based and Web-based Methods
2001, February	Technical Analysis and Problem-Solving
2001, April	Effective Statistical Process Control Training
2001, April	Connecting Company Databases to The Internet
2001, April	Elimination of Automatically Generated Material Adjustment Transactions
2001, July	A Windows Terminal Server Deployment Strategy

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Biographical Information

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