

Assessing the added value of education in project management tuition/training.

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Theme: Quality Assurance in Higher Education

Abstract

Various programs in higher education feel a need to teach project management skills to students. Measuring the effect of education is a challenge especially when focused on behavioral skills. Research on learning gains often turns to the method of Students Assessment of Learning Gains (SALG). This article constructs five design criteria for an instrument that measures added value: measure satisfaction, use pre- and posttests, use perceived ability, account for learning stage one and account for attrition. A first design was tested on a semester of a professional master in project management. The test yields ambiguous results, further research is required.

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Project management competences and assessment

Project management is offered as a significant component in a range of undergraduate and postgraduate academic qualifications, including construction, engineering and IT (Crawford, Morris et al. 2006) which is in line with the desire to make the higher education studies more relevant to daily work practice (Pant, Baroudi 2008). Martin claims that project management is an important element of both management and engineering education (Martin 2000). But incorporating project management is not easy, as Ellis, Thorpe and Wood (2003) note: 'Project management is a challenging subject to deliver, not least because of the wide variety of skills and knowledge it embraces.'

There is a great variety of suggested ways to convey project management competences: simulation training, service learning, PBL, PBL with a project manager from a different study, case study, etc (see Nijhuis (2012) for an extensive list of literature). Most of these alternatives are not evaluated on the success of the pedagogical approach, but by means of student enthusiasm ('I learned a lot') and/or 'ticking off' products (planning, report).

It can be argued that assessing competences of project managers is already available, but those assessments are targeted at project managers with experience and not at student level (CAPM, PMP, IPMA-x, APM, GAPPS) or are aimed at the knowledge component only (Prince2, IPMA-D).

Measuring and evaluating the success of a pedagogical approach /.../ is crucial as it allows one to determine if the given approach is indeed effective, with objective measures to accompany the claim (Lim, Hosack et al. 2012). Although assessment has been implemented for a long time in project management (Beaubier, Thayer 1973), it is found to be a difficult task to perform correctly in higher education (chapters 8-11 in Edwards, Knight 1995).

It is important to measure the added value instead of learning outcome, as the incoming ability is the largest predictor of the outcome ability (Ewell 2002).

Kirkpatrick (1959, 1996, 2006) gives a four level model of evaluation. The first level is how the students value the direct experience - also known as the smile sheet -, the second level measures the direct learning effect, the third level tests if a permanent learning effect has occurred and the fourth level looks for the added value in the workplace. Kirkpatrick argues that measuring the second level can only be done if the first level is measured (criterion 1), and that the second level needs a pre- and posttest (criterion 2). He adds 'Increase knowledge

is relatively easy to measure /.../ we can measure attitudes with a paper-and-pencil test /... / [for skills] a performance test is necessary' (Kirkpatrick, Kirkpatrick 2006 p50-51).

A relative simple form of a performance test is a 360 degrees feedback system where the student is evaluated by a group of peers. One of the drawbacks is that a pretest is not possible when students do not have ample experience with each other. This system does not comply with criterion 2. More elaborate performance tests (like role play or expert assessment) have the disadvantage of being labor (and money) intensive (Kuntze 2009, Axelrod 1976).

Students assessment of learning gains

Various researchers turn to Students Assessment of Learning Gains (SALG) (Seymour, Wiese et al. 2000, Vogt, Atwong et al. 2005, Anderson, Burns 2013, Anderson 2006, Lim, Hosack et al. 2012, Rooij 2009). There is a difference in how SALG is used. Most don't use a pre test, some ask students what activities helped the learning process (Anderson, Burns 2013) and some ask students their perceived learning gains in a post test (Vogt, Atwong et al. 2005, Rooij 2009). The students can be asked to assess their own ability to perform a task. Since students could be without experience, it would be better to ask students for their perceived ability (design criterium 3).

There is a risk in self assessment. But 'though it has some limitations [it] may be used as part of a multi-source evaluation scheme' (Symons, Swanson et al. 2009). They go on to conclude 'Most studies of self-assessment are in areas of technical knowledge and ability. Even in concrete areas such as these, self-assessment has been found to be inaccurate'.

It can be argued that if self-assessment is used in a pre- and post test, with the same scales, the only thing that is measured is the gain. This does require experience of the student in the subject that is being (self) assessed. If a student has never made a planning for a project before, the pre-self-assessment of a student's ability to make a planning could give inaccurate results.

The learning cycle (Maslow 1954) could be described as starting at stage one: unconscious incompetent. The next stage is described as conscious incompetent, also referred to as 'you know that you don't know'. The following stages are conscious competent and unconscious competent. Going from stage one to stage two is learning, but detecting this in a pre- and posttest on perceived ability poses a challenge. A fitting example is asking a seventeen year old without any driving experience if he considers himself able to drive the car out of the

garage (backwards). There will be several that will consider themselves quite able, while actually being in stage one. They could move to stage two in their first driving lesson. Asking them if they are able to drive the car out of the garage backwards after the first driving lesson will most probably give a lower confidence level (perceived ability) than on the pretest. The design of an instrument to test added value will have to account for this effect (design criterion 4).

Another challenge is the effect of students not completing the whole course and therefore not handing in a posttest. A level of attrition of 25% is not uncommon (Lim, Hosack et al. 2012), which poses a challenge for the evaluation of the results. Given the uncertainties in self assessment it would be unwise to compare pretest and posttest results without accounting for the attrition (design criterion 5).

Design criteria

Concluding, the set of design criteria for an measuring added value could be:

1. Measure level one (the smile sheet)
2. Use pre- and posttest
3. Use perceived ability
4. Account for learning stage one
5. Account for attrition

The effect of the learning cycle can be countered by asking the student for their perceived ability in the pretest and asking on what experience this perceived ability is based. Posttest results of students with no previous experience should be scrutinized for the reported difference in their perceived ability. This means that in the evaluation of the test results either students should be asked again for their previous experience or it should be possible to link the pre- and posttest on an individual basis.

Linking the pre- and posttest on an individual basis provides an opportunity to account for attrition. Pretests of students without posttests should be discarded for the evaluation of added value. It is evident that these discarded pretests can be an useful source for evaluating pedagogical approaches in other ways.

A level one measurement can only be done at the end of the pedagogical approach, so should be included in the posttest. This level one measurement also allows researchers to evaluate the effect of satisfaction with the pedagogical approach on reported posttest ability.

To summarize, a instrument to measure added value should have a pretest which asks students about their previous experience with the subjects and asks their perceived ability on the subjects. The pretest is coded on an individual level (e.g. student number).

The second part of this instrument should be a posttest which asks students their satisfaction with the pedagogical approach (and environment) and their (new) perceived ability on the subjects.

The case of a professional master in project management

A first design based on these criteria was tested on the first seven months of a Professional Masters program (Master of Project and Process Management in the Green Environment) focusing on soft skill development with coaches and actors, lectures on project management subjects and a complex group project. The complexity of the group project was created by having the group look for a project sponsor which was willing to let them work on a 'non undisputed problem'. In other words, the project had to involve some kind of controversy like conflicting stakeholders or failed first attempts. There were two teams and both succeeded in finding a sponsor with a non undisputed problem. The soft skills development was on individual and group basis, particularly on personal effectiveness. The lectures on project management subjects hosted a mix of scientific publications, project management methods, process management approaches, theoretical exercises and group reflection on the group project relating to the theory. Ten students entered the master, nine finished the first seven months.

The students met every week for skills and lectures for one and a half day, and were asked at the end of every day to reflect on the quality of the day (like: quality of the teaching staff, quality of interaction etc.), therefore accounting for the level 1 measurement (design criterion 1).

The survey pretest asked for experience (working in projects, leading projects, giving assignments to project managers), trust in knowledge (theory, methods and techniques) and trust in skills (starting a project, executing a project, bringing a project to an end and closing a project). The trust questions were given a five point Likert scale ranging from no trust to

high trust. The experience was given a four point Likert scale ranging from none to experienced (more than five projects). When experience was claimed the student had to fill in the turnover of the most recent project. The pretest was handed out and filled in at the kickoff session of the program.

The posttest survey asked the same questions, and asked students where they perceived their learning gains (subjects project communication, leading projects, planning and monitoring projects, people skills, risk management, negotiation skills, decisiveness, team building, their own domain and project management methods and techniques), in a three point Likert scale ranging from no progress to considerable progress. It also hosted a not applicable option. The posttest was supposed to be handed out and filled in at the closing session of the first part of the program, but was sent by e-mail afterwards instead.

The survey forms were not coded to an individual student, but asked their experience twice. Although the sample was small, it was not possible to link all post test surveys to the pretest surveys. Six students returned the posttest, four could be linked to the pretest.

Student 1: experienced project manager (led more than 5 projects, turnover on last project €80.000). This student reports a gain in trust on all three knowledge areas with one point and on two of the four skills, also with one point. This student reports some perceived progress on leading projects, own domain and project management methods and techniques) and considerable progress on people skills and team building. There was no perceived progress on the other subjects.

Student 2: experienced project manager (led and assigned more than 5 projects, turnover on last project €2.000.000). This student reports a gain in trust in knowledge, theory but a loss in trust in knowledge of techniques (both one point). No gain or loss was reported on trust in skills. The student did not complete the perceived progress part of the survey.

Student 3: inexperienced project manager (led- 1-2 projects, turnover € 20.000). This student reports a knowledge trust gain on theory and on skills in executing a project (both one point). On perceived gains, this student reports no progress on negotiation skills, but some or considerable progress on all other subjects (considerable on project communication, planning and monitoring and own domain).

Student 4: experienced project manager (led and assigned more than 5 projects, turnover €5.000.000). This student reports knowledge gains on all three knowledge areas (one point)

and a loss of trust in skills on starting a project (from highly confident to confident). This student reports a perceived progress on all subjects, some progress on planning and monitoring and on decisiveness, the rest is reported as considerable progress.

Discussion

No student reports a big change in their trust level. The reported changes could be attributed to different causes, with education being only one of them. It could also be respondent error, since asking for trust is a subjective measurement and small changes could occur depending on the respondents well being. The reported perceived gain shows a much more pronounced result than the trust questions. A cause could be that the trust questions are relatively abstract compared to the perceived gain questions. Another cause could be that asking for perceived gain could evoke a socially acceptable answer (since the level one surveys showed a high student satisfaction).

Remarkable is that a experienced project manager (student 4) reports more perceived gains than the inexperienced project manager (student 3), which is in contrast to what could be expected. The causes of this unexpected result can only be speculated. Another experienced project manager (student 1) reports much less perceived gain.

At this point it is unclear if any of the two instruments provides a valid representation of the added value.

Regarding the design of the instrument two comments can be made: even in a small group it is important to have a unique coding per individual student and even if level one surveys are done, an individual level one section needs to be incorporated on the survey itself.

Conclusion

The first test of this instrument does not yield unambiguous results. Further research is needed to deduct whether asking for perceived learning gains or comparing perceived ability in pre- and posttest could be used to assess added value. It is recommended to use the same abstract level in perceived ability questions and the perceived learning gains questions and use an independent validation of both methods (like an expert opinion of learning gains). This test will be done in a future study.

ANDERSON, A.K., 2006. An Assessment of the Perception of Learning Gains of Freshmen Students in an Introductory Course in Nutrition and Food Science. *Journal of Food Science Education*, **5**(2), pp. 25-30.

ANDERSON, D. and BURNS, S., 2013. One-Minute Paper: Student Perception of Learning Gains. *COLLEGE STUDENT JOURNAL*, **47**(1), pp. 219-227.

AXELROD, R., 1976. *Assessing Learning Gains in Political Science*. Teaching Political Science.

BEAUBIER, E.W. and THAYER, A.N., 1973. *Project Leadership. Assessment Alternatives*.

CRAWFORD, L., MORRIS, P., THOMAS, J. and WINTER, M., 2006. Practitioner development: From trained technicians to reflective practitioners. *International Journal of Project Management*, **24**(8), pp. 722-733.

EDWARDS, A. and KNIGHT, P., 1995. *Assessing competence in higher education*. London: Kogan Page.

ELLIS, R., THORPE, T. and WOOD, G., 2003. E-learning for project management. *Proceedings of the Institution of Civil Engineers. Civil Engineering*, **156**(3), pp. 137-141.

EWELL, P., 2002. An emerging scholarship : a brief history of assessment. In: T.W. BANTA, ed, *Building a Scholarship of Assessment*. San Francisco, CA: Jossey-Bass, pp. 3-25.

KIRKPATRICK, D., 1959. Four-level training evaluation model. *US Training and Development Journal*, .

KIRKPATRICK, D., 1996. Great Ideas Revisited. Techniques for Evaluating Training Programs. Revisiting Kirkpatrick's Four-Level Model. *Training and Development*, **50**(1), pp. 54-59.

KIRKPATRICK, D.L. and KIRKPATRICK, J.D., 2006-last update, Evaluating training programs the four levels [Homepage of Berrett-Koehler], [Online].

KUNTZE, A.J.(., 2009. *Assessing Progress in Mastery of Counseling Communication Skills*, Erasmus University Rotterdam.

LIM, B., HOSACK, B. and VOGT, P., 2012. A Framework for Measuring Student Learning Gains and Engagement in an Introductory Computing Course: A Preliminary Report of Findings. *Electronic Journal of e-Learning*, **10**(4), pp. 428-440.

MARTIN, A., 2000. A simulation engine for custom project management education. *International Journal of Project Management*, **18**(3), pp. 201-213.

MASLOW, A.H., 1954. *Motivation and personality*. New York: Harper & Row.

NIJHUIS, S.A., 2012. Learning for project management in a higher education curriculum, *Project Management Institute Research and Education Conference 2012* 2012.

PANT, I. and BAROUDI, B., 2008. Project management education: The human skills imperative. *International Journal of Project Management*, **26**(2), pp. 124-128.

ROOIJ, S.W.V., 2009. Scaffolding project-based learning with the project management body of knowledge (PMBOK®). *Computers & Education*, **52**(1), pp. 210-219.

SEYMOUR, E., WIESE, D., HUNTER, A. and DAFFINRUD, S.M., 2000. Creating a Better Mousetrap: On-line Student Assessment of their Learning Gains. *National Meeting of the American Chemical Society*, 27-03-2000 2000.

SYMONS, A.B., SWANSON, A., MCGUIGAN, D., ORRANGE, S. and AKL, E.A., 2009. A tool for self-assessment of communication skills and professionalism in residents. *BMC Medical Education*, **9**(1),.

VOGT, G., ATWONG, C. and FULLER, J., 2005. Student Assessment of Learning Gains (SALGains). *Business Communication Quarterly*, **68**(1), pp. 36-43.