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Project management tuition or training, can we assess the added value of them?

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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 usually turns to the method of Students Assessment of Learning Gains (SALG), which can be questioned on reliability. This article constructs five design criteria for an improved Students Assessment of Learning Gains (SALG): measure satisfaction, use pre- and posttests, use perceived ability, account for learning stage one and account for attrition. A first test on a semester of a professional master in project management yields ambiguous results. The second test with a 360 degrees measurement is performed on the same semester with different students. The post test is scheduled for June 2014, results will be reported at the World Congress.

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1. Introduction: project management competences and assessment

Higher education for several professions, such as Information and Communication Technology (ICT), Engineering, and Construction teach their students project management for various reasons (Car, Pripuzic, & Belani, 2010; Divjak & Kukec, 2008; Fernández, Cabal, Balsera, & Huerta, 2010; Lebcir, Wells, & Bond, 2008; McDonald, 2001; Mengel, 2008; Nooriafsha & Todhunter, 2004; Reif & Mitri, 2005; Rennie & White, 2002; Rooij, 2009;

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Stoyan, 2008). Crawford, Morris, Thomas, and Winter (2006) state: 'Project management is offered as a significant component in a range of undergraduate and postgraduate academic qualifications, including construction, engineering and IT,' which is in line with the desire to make the higher education studies more relevant to daily work practice (Pant & Baroudi, 2008). Martin (2000) claims that project management is an important element of both management and engineering education. 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.' Michel and Prévôt (2009) note that more emphasis should be placed on soft skills such as social, emotional and organizational.

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, or other (see Nijhuis (2012a) 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). And a link between these certification systems and achieving project success is almost nonexistent (Morris, Crawford, Hodgson, Shepherd, & Thomas, 2006; Turner, Müller, & Dulewicz, 2009).

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, & Vogt, 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). The required behavioural skills ... are difficult to assess and innovative approaches are required (Youker, 2012).

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, and that the second level needs a pre- and posttest. 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' (D. L. Kirkpatrick & Kirkpatrick, 2006 p50-51) (design criteria 1 & 2).

A relative simple form of a performance test is a 360 degrees feedback system where the student is evaluated by a group of peers. The 360 degrees feedback system has the disadvantage of lacking previous experience with the student in the peer group, which would make the pre-test useless and therefore unable to measure learning gains. More elaborate performance tests (like role play or expert assessment) have the disadvantage of being labor (and money) intensive (Axelrod, 1976; Kuntze, 2009).

2. Students assessment of learning gains

Here introduce the paper, and put a nomenclature if necessary, in a box with the same font size as the rest of the paper. The paragraphs continue from here and are only separated by headings, subheadings, images and formulae. The section headings are arranged by numbers, bold and 10 pt. Here follows further instructions for authors.

3. Main text

Various researchers turn to Students Assessment of Learning Gains (SALG) (A. K. Anderson, 2006; D. Anderson & Burns, 2013; Lim, Hosack, & Vogt, 2012; Rooij, 2009; Seymour, Wiese, Hunter, & Daffinrud, 2000; Vogt, Atwong, & Fuller, 2005). 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 (D. Anderson & Burns, 2013) and some ask students their perceived learning gains in a post test (Rooij, 2009; Vogt, Atwong, & Fuller, 2005). If SALG is used for assessing the added value, a pre- and post test will be necessary (D. Kirkpatrick, 1959). 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, McGuigan, Orrange, & Akl, 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 of self assessment. 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) then on the pre-test. 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 post-test. A level of attrition of 25% is not uncommon (Lim, Hosack, & Vogt, 2012), which poses a challenge for the evaluation of the results. It is argued that given the uncertainties in self-assessment it is unwise to compare pre-test and post-test results without accounting for the attrition (design criterion 5).

4. Design criteria

Concluding, the set of design criteria for an improved SALG 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

This list does not mention the most obvious of design criteria: measuring added value has to be affordable in time spend by tutors, trainers and students alike. This explains why a SALG questionnaire is an obvious choice.

The effect of the learning cycle can be countered by asking the student for their perceived ability in the pre-test and asking on what experience this perceived ability is based. Post-test 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 post-test 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 pretests can be a 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. Though not the purpose of this paper, a level one measurement can also provide useful information for an attrition analysis.

The design proposal of an improved SALG is therefore:

A pre-test that 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).

Post-test which asks students their satisfaction with the pedagogical approach (and environment) and their (new) perceived ability on the subjects.

5. First test, 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 who 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 an 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.

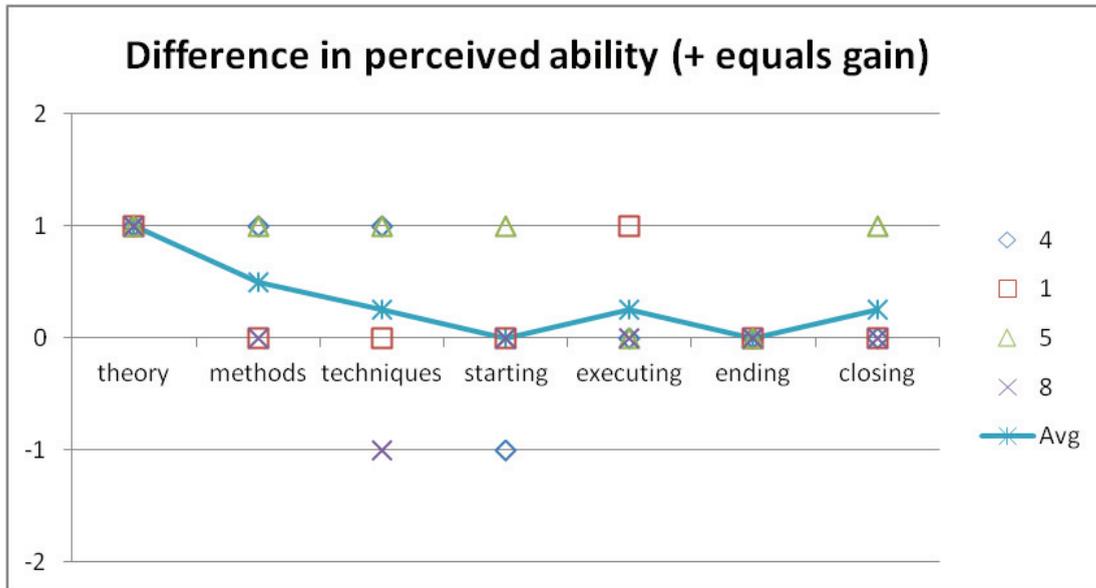


Figure 1. Difference in perceived ability.

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 post-test, 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).

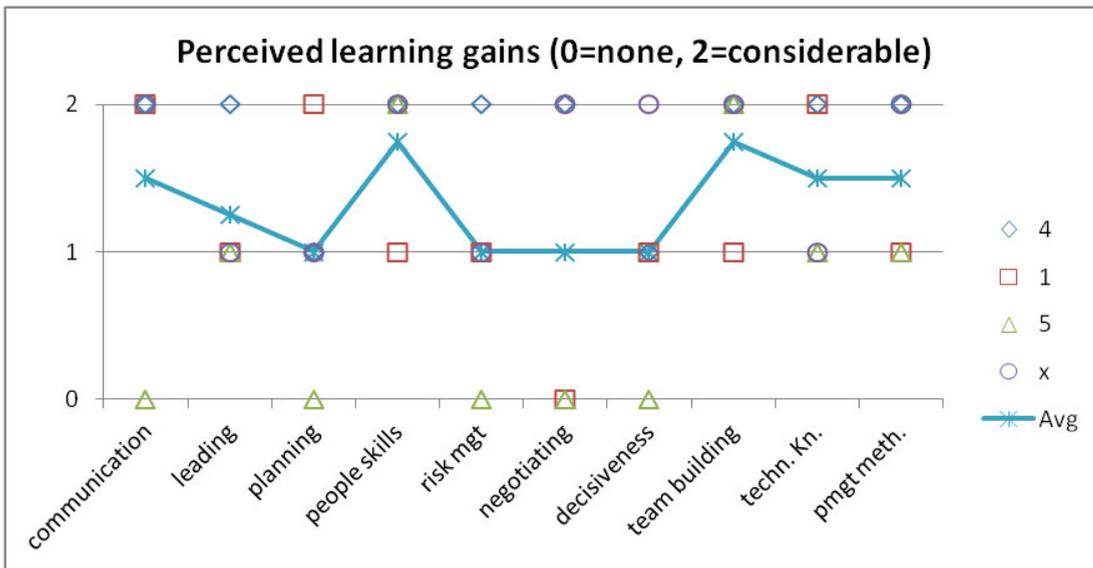


Figure 2. Reported perceived learning gain.

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.

No student reports a big change in his or her trust level. The reported small changes could be attributed to different causes, with education being 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. See figures 1 and 2 for a graphical representation.

Remarkable is that an 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 remains unclear which of the two measurements - if any - provides a valid representation of the added value.

6. Second test: same master, new students, improved measurement

The first test of this instrument did 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. The same master with a new group of students is monitored, this time with a few additions in the instrument.

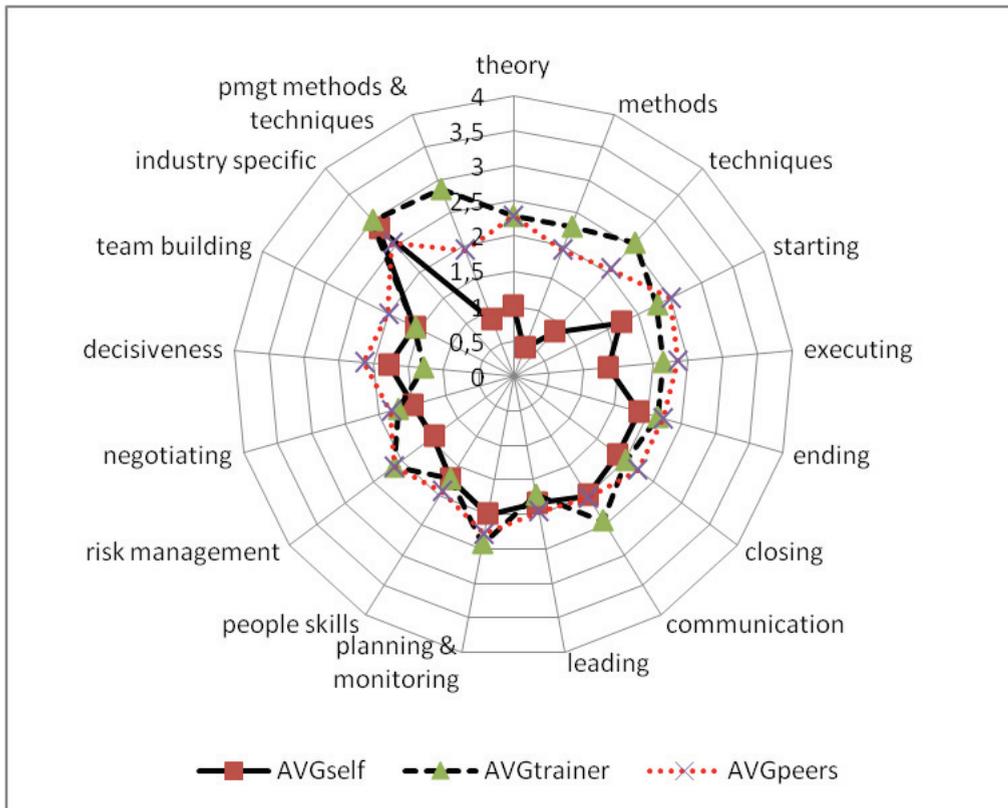


Figure 3. Differences in self, trainer and peer evaluation

Students numbers are introduced, so linking pre- and posttest can be unambiguous. The section of perceived gains is introduced as a pretest as well and a short level one satisfaction questionnaire is added. The most important change however is the introduction of a 360 degrees feedback system. The students are evaluated by two peers and the trainer (author is not the trainer). Students and trainers got acquainted with each other (that is experience in a simulated working situation) before this pre-test is taken.

There are seven participants in the master. Two experienced students, two moderately experienced students and three students with little or no project management experience. The pre-test shows a that on average the students value their knowledge of project management theory, methods and techniques to be low while their peers and trainers value them much higher on the same scale. Lesser differences but sharing the same image are risk management, starting and executing projects. On the other questions there appears to be a congruent picture – on average. Almost all points of measurement are lower in the self-evaluation than that of peer or trainer evaluation (see figure 3 for an illustration).

Looking at the students individually two of them score themselves consistently lower (no subjects higher) than trainer or peers. Four of them score mixed, but not more than two subjects score higher. Only one of the students evaluated him/herself on four subjects higher than peer or trainer evaluation. In most of these instances there is not more than one option difference (next level answer).

A difference of more than one answer option are only seen when the students self-evaluation is lower than that of peers and/or trainer. These subjects are: knowledge of project management theory (5), Knowledge of project management methods (5), knowledge of project management techniques (4), starting a project (1), executing a project (1), communication (1), planning and monitoring (2), risk management (1), negotiation (1), team building (1), industry specific knowledge (1) and project management methods & techniques (5).

The post-test will be done in June, results will be incorporated in the presentation at the World Congress.

7. Conclusion and further research

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