Displacing the Sage on the Stage: Student Control of Learning

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Abstract

Student-centred learning implies an increased degree of responsibility in the learning context by the student, and an equally increased level of delegation by the teacher. This paper looks at Grow’s model of student development towards life-long learning, and discusses the adaptations made to a Software Engineering curriculum in order to empower students to take control of their learning.

1. Introduction

‘Student-centred’ is a term used to refer to learning environments that pay careful attention to the knowledge, skills, attitudes, and beliefs that learner brings to the educational setting [1]. In general such an environment gives students greater autonomy and control over choice of subject matter, learning methods and pace of study [2].

An important implication of this definition is the need for students to assume a high level of responsibility in the learning situation and be actively choosing their goals and managing their learning. This involves considerable delegation of power by the teacher, but increases the potential for learning ‘transfer’ to occur [3].

However, not all student-centred environments purport to address key concepts (eg high order learning, authentic problems and knowledge construction) equally – rather they may be placed on a continuum based on the degree of teacher-control maintained. This paper explores a journey undertaken by cohorts of Software Engineering (SE) students towards controlling their learning. By implication, it maps the teacher’s journey, from sage on the stage to guide on the side and beyond – to a resource available to students as and when needed.

2. Modelling learning

How ready the students may be for a student-centred approach is dependent on their perception of learning [4]. From the perspective of the learner’s ‘growth’ towards life-long learning Grow [5] models learning that reflects the principles advocated in student-centred environments: the learner determines the need for some education, decides on a preferred approach to learning, identifies/accesses resources and draws on teachers as part of that overall strategy rather than as a central element. In summary, the stages of growth are:

- **Stage 1** an authority figure gives learners explicit directions on what to do, how to do it, and when. The teacher acts as authority, coach
- **Stage 2** learners are interested or able to be. The teacher acts as motivator, guide
- **Stage 3** learners are participants in their own education and benefit from learning more about how they learn. The teacher acts as facilitator
- **Stage 4** learners set their own goals and standards and use experts, institutions and other resources to pursue these goals. The teacher acts as consultant, delegator.

Learning models that address the challenge of empowering the student with the ability to undertake life-long learning apply strategies that align with some or all of

3. Teacher as guide on the side

Previous papers have described the development of a model to address issues of appropriate environments in SE [8, 9]. An analysis of the learning required for complex disciplines, in conjunction with a review of practitioner studies of graduate deficiencies [10], led to a longitudinal study of alternate learning models for the SE curriculum at Murdoch University.

3.1. Students as apprentices

The initial model, Cognitive Apprenticeship, aligned to Stages 1 and 2 of Grow’s model. For approximately 50% of the cohort, the teacher’s role became one of supporting (Scaffolding) and later intervening when requested/required (Fading). However, other students continued to ‘demand’ a Modelling and Coaching role.

Ambivalence about the learning environment was clear: while some students appreciated it as co-operative and interactive, others felt it shifted the burden too heavily to their shoulders. In the final analysis, many just wanted to be taught. This perspective is not unexpected – as Baxter-Magnola [11] suggests, students at low epistemological stages of development believe that every intellectual and moral question has one correct answer and their (competent) teachers know what it is.

Although results from a follow-on course showed an improvement in student success rate, they continued to express concerns regarding the learning environment – that the problem was open-ended and too big (the teacher should establish tight boundaries), that they had to estimate and manage the project themselves (rather than having milestones imposed) and that their assessment was based on the motivation and performance of the rest of the class (ie group-based). Students were still dependant on a high level of direction from the teacher.

3.2. Students as problem solvers

The next model applied within the SE program sought to centre learning on students more explicitly, to provide strategies for deep understanding of the discipline content and to focus on the higher order skills of analysis, synthesis and evaluation [12] in a richly collaborative environment. Since SE is a rapidly changing discipline, this learning environment, based on Problem-based Learning (PBL), focussed on metacognitive strategies and reflection to assist students to transfer the skills and knowledge learnt to other contexts. This environment addressed Stage 3 of Grow’s model: with the teacher as facilitator, students are empowered to explore the course material on their own and with their peers.

From the perspective of student empowerment, however, the Creative PBL [13, 14] model failed to realise the promise suggested by the literature.

3.3. Students as novice practitioners

A mentor/protégé relationship [15] is seen to allow teacher and learner to seek understanding of each other’s position with the aim of agreement and/or defensible deviations. However challenging learning requires a confidence in the learner that is not often present at novice stage. The Studio Learning [16] model added, to the positive aspects of both PBL and the reflective learning advocated by Schön [17], aspects of Laurillard’s learning discourse [18].

The environment is set up for students to transition to Grow’s Stage 4. While some students were critical of the lack of guidance provided, others could see the value of a lesser
reliance on the teacher (requires self motivation to research what we were to produce; proactive learning - good chance of absorbing info better). The validity of this observation was tested in a follow-on unit which focussed on learning a complete new sub-discipline of SE. Here changes in student interaction, both in the group context and with the teacher, could be observed, with the course organised to maximise decision-making by the students. They:
  o set their own goals and standards - it was the cohort’s decision whether a final exam would be scheduled – it depended on their ability to present and demonstrate a product by the exam period (the examination became a fall-back)
  o used experts, institutions, and other resources to pursue these goals - students did not rely on the teacher as the ‘lecturer’ – rather to value a consultant resource
  o are both able and willing to take responsibility for their learning, direction, and productivity - for each task students were able to negotiate scope and deliverables: the main criterion was that the learning objectives could be met
  o exercise skills in time management, project management, goal-setting, self-evaluation, peer critique, information gathering, and use of educational resources - as well as satisfying all the criteria for advanced learning (including sufficient complexity to permit an evolving design space; multiple acceptable solutions, etc) the problem had sufficient ‘length’ to require management of time, self and resources.

Figure 1 Interaction schedules Sessions 1,2 & 3

Although presenting a working demo of the problem/system required considerable more effort, each cohort decided to dedicate the (extra) time required. The implication is students’ ability to gauge the level of proficiency of their attempts to master the problem and complete the task: they appear to be drawn actively into the problem environment, suggesting ‘real learning’ is occurring. This aligns well with Stage 4 of Grow’s model. A log (see Figure 1) of transactions undertaken within the class provides significant insight of performance during each learning session: a willingness on the part of students to vary their behaviour based on the specific needs of the learning situation, calling on the teacher only as required.

4. In Conclusion

The transition from explicitly authoritative teacher to facilitator is absolutely essential, but with that change the teacher remains an authority without being in authority. Grow refers to this teacher role as one of delegating: the teacher no longer teaches the discipline content but cultivates the students’ ability to learn. This aligns with the belief that general student attitude towards the controllability of the learning outcome (ie externally dictated and beyond student control, or within the control of the student through effort and personal interest) influences motivation and level of achievement in the learning process [19].
When the course is not aligned with learner interests or the situation constrains the students approach to learning, the dependent learner mode will tend to dominate – control of the learning process is relinquished to the teacher, while the student will demand carefully articulated structure, clear guidance and clearly-defined assessment. The learning, in many cases, is reduced to assignment hopping with ‘just-in-time’ and ‘just-enough’ learning to fulfill the assessment tasks [20]. The Apprenticeship cycle of this study exhibited some of these traits – students focussed on learning the tools and techniques of SE rather on either higher or softer skills.

However, when the unit is aligned with the learner’s interests and the situation allows them to adopt their preferred learning styles, students will tend to display a mature learning behaviour. The students will prefer to design their approach to the material and will focus on the salient points that address their needs. The findings discussed above suggest that attaining Grow’s Stage 4 maturity is a feasible objective within an undergraduate program.

5. References