USING TECHNOLOGY TO INCORPORATE STUDENTS' WORK-BASED EXPERIENCES INTO A BLENDED LEARNING ENVIRONMENT

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Abstract

This paper disseminates the experience of the authors in using a software-supported learning framework, called Experiential Learning Via Industrial Stories (ELVIS), which exists as part of a compulsory final-year undergraduate module for computer science and software engineering sandwich students. The module is designed to enhance the transformation of students from learners into practitioners on graduation. ELVIS is a tool to help this transformation, by enabling students to share their experiences drawn from the world of work. The paper discusses the ELVIS framework, its current implementation, the software tools and procedures used, and current levels of student engagement.

Introduction

The Experiential Learning Via Industrial Stories (ELVIS) framework is the outcome of a RITA-funded (Research Informed Teaching Award) project, to investigate how the industrial experiences of final-year computing students could be incorporated into their studies. As such, ELVIS is a student collaboration tool, as advocated by Christiansson (2004).

ELVIS currently exists as part of a compulsory final-year module, entitled *Software Quality, Professionalism and Ethics*, for students on computer science and software engineering sandwich courses. It is important to note the sandwich structure of these courses, where students spend two years at university, their third year in relevant industrial employment, and their final year back at university, because it is the experience gained during the industrial employment that forms the crucial core of the framework.

The *Software Quality, Professionalism and Ethics* module was designed to enhance the transformation of students from learners into mature and competent practitioners, as they move towards graduation. For this transformation to be successful two issues had to be addressed:

- An overlapping study of technology, application and ethics so that students understand the wider implications of and influences on computing technology in the real world.
- Student engagement in discussion and debate concerning a range of real-life professional issues within the three related topics mentioned above.

The module, which uses a blended-learning approach, comprising weekly large-group interactive sessions, a virtual learning environment and various technology clinics, does just that. The aim of ELVIS is to make the integrated study of these new and, to some, alien topics relevant to students' own experiences, in order to maximize their engagement with the module.

This approach is in accord with previous findings (Andresen et al., 1999, p. 225), which advocate "the recognition and active use of the learner's relevant life experiences." The driving conviction behind this approach is the belief that "[if] new learning can be related to personal experiences, the meaning thus derived is likely to be more effectively integrated into the learner's values and understanding" (Andresen et al., 1999, p. 225). In the case of ELVIS, learning is linked to industrial experiences.

A major component of ELVIS is reflection, leading to deep learning (Hinett, 2002a). Student reflection is accepted as a valuable tool that, according to Philip (2006, p. 37):

- Allows students to get the most from their education and other activities
- Sets the scene for and creates life-long learning
- Maximises personal and economic potential
- Enhances employability and enterprise skills

Indeed, Kolb (1984) suggests that reflection is key in cyclic experiential learning. McDermott et al. (2002) reinterpret the Kolb cycle as an alternation between two groups of activities: experiential and reflective. In this case, we identify the experiential activities as the industrial placement year and the final year project. The reflective activities are the *Software Quality, Professionalism and Ethics* module and ELVIS as one of its components. There are, of course, barriers to students being able and willing to be reflective, which include the assessment-driven nature of students. "This is a natural strategic approach that is widespread amongst students, and maybe we should be more accepting of this and so ensure all desired learning outcomes are taken into account during the assessment process" (Philip, 2006, p. 37).

The type of deep learner that ELVIS seeks to promote was originally defined by Marton and Säljö (1984) and subsequently endorsed by Duignan (2002) who states

"The deep learner examines theoretical ideas in the light of his or her experience; evidence is gathered, organised and structured into a form that renders coherence to the information and to its relationships and cognitive consequences" (p. 218).

It was during a review of the module in its early days that the tutors became aware of the rich knowledge-base of nearly 100 years of student industrial experience to be mined. The conclusion was that this was an invaluable source of knowledge that students would benefit from. Thus the ELVIS research project was launched to address the question of how to capture and share this knowledge, and integrate it with the existing learning objectives of the module.

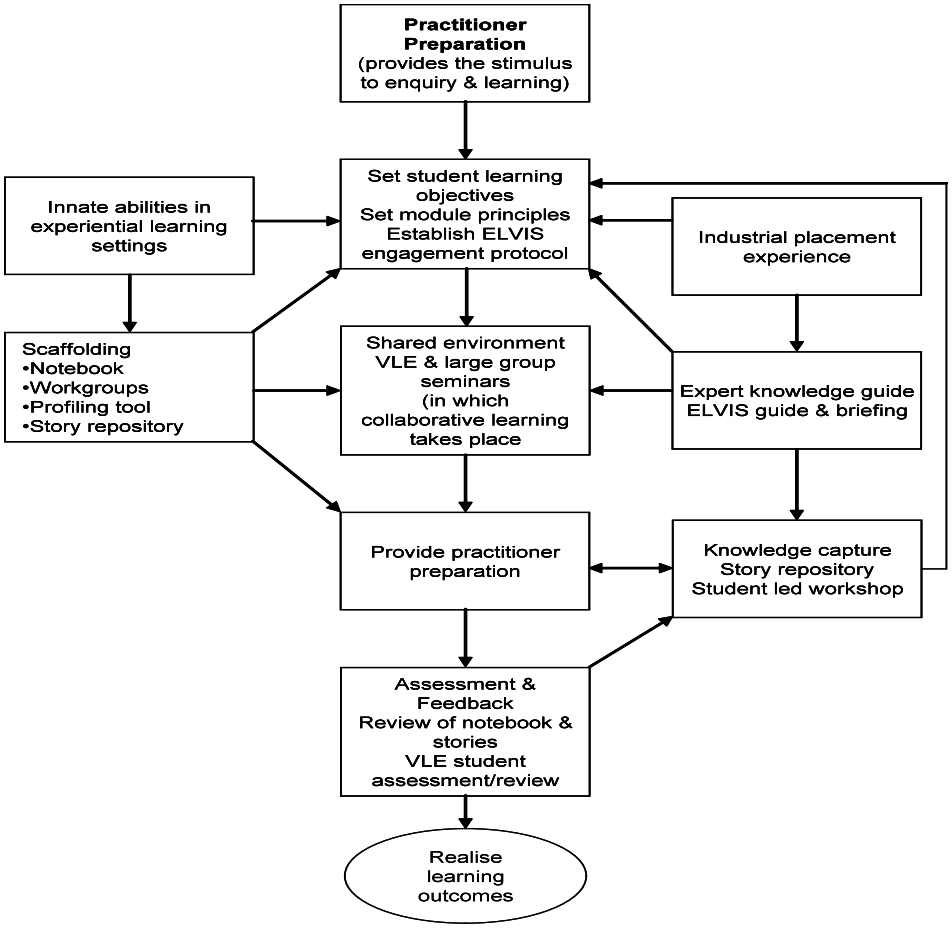
The key points that ELVIS is founded on are:

- to promote deep learning rather than surface learning through reflection
- to share stories in order to support and enhance the relationship between students, thus creating new knowledge and learning from others
- to implement a reflection log (in the form of a student notebook) that facilitates purposeful learning
- to encourage students to learn from each other by way of complementing the traditional student-teacher learning relationship
- to overcome the barrier of assessment-driven pedagogy, replacing it with a learning-driven pedagogy
- to use storytelling as a means of encouraging reflection

The Experiential Learning Pedagogy

The Experiential Learning Pedagogic model, which was adapted from Juwah (2002), is shown below in Figure 1. While the original model supported problem-based learning, this model supports experiential learning, which is incorporated into various problem-based learning exercises carried out during interactive group sessions. In this respect, ELVIS begins by helping to develop reflection skills and story-telling capabilities on an individual basis; but, as the year progresses and stories are released to the group domain, via a shared repository, ELVIS supports the collaborative learning that takes place in group sessions that leads to enhanced knowledge for all members.

Figure 1: The Experiential Learning Pedagogic Model



The ELVIS Framework

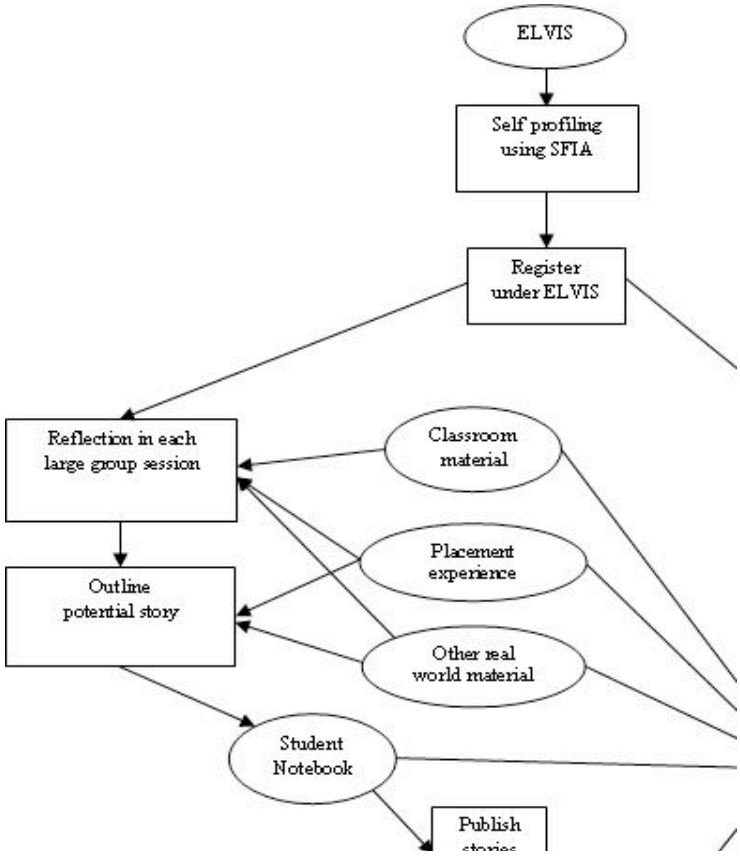
The ELVIS framework enables students to capture, communicate and consume workplace knowledge, experience and lessons learnt. The mechanism used is the production of short, work-based stories related to topics covered in the module. The framework comprises:

- A skills profiling tool, based on the industry-standard SFIA v3 (see http://www.sfia.org.uk/), so that (a) students appreciate the complete spectrum of skills used in IT and understand where their particular work fits into this scheme; and (b) tutors can monitor the type of work their students were involved in.
- A quiet period during the weekly large-group sessions to reflect on the topics covered, linked to …

- A student notebook for capturing all reflections, ideas and story outlines, during and after the quiet period
- A repository of those stories, with summary of lessons learnt, that students have decided to release, to be shared amongst the cohort
- A student-led workshop, and
- An online evaluation using the current Virtual Learning Environment (VLE).

How these components fit together is shown in Figure 2 below.

Figure 2: The ELVIS framework



The starting point is the skills profiling tool, followed by registration under ELVIS. Once students are fully familiar with the spread of skills in IT and their own place in it, they use that knowledge as part of their registration process. This is how the tutors are made aware of their students' experiential background.

Once the registration is complete, students take part in two parallel strands of work:

- producing their stories
- preparing for the student-led workshop

The production of stories involves several phases:

- reflection on the topics covered in weekly sessions and how these topics relate to their own experiences;
- participating in discussions during weekly sessions, to generate and fine-tune thoughts (i.e., moving their ideas forward);
- making notes to identify potential stories;
- writing up and releasing a minimum of six selected stories to the group domain; and
- commenting on the released stories of peers, as another way of moving ideas forward.

The culmination of ELVIS-related activities is the student-led workshop. The purpose of this workshop is for students to bring together their ideas and reflections, formulated during the year, and discuss these in an open forum.

For the workshop, the first thing students need to do is to choose the role they wish to play. There are several roles to choose from, these being coordinators, workshop chair, presenters, panel members, and researchers. Participation in the workshop is voluntary and, for those who chose to participate, the roles are allocated on a first-come-first-served basis. The incentive for undertaking a workshop role is the option to publish a minimum of three stories, instead of six. Students, acting as coordinators, oversee the forming of teams, their membership, and topics to present.

Once all required stories have been submitted and the workshop has been run, the last activity is the online reflection survey which provides students with one last opportunity to consider both the relationship between study and practice and the transformation from the former to the latter.

Software Support

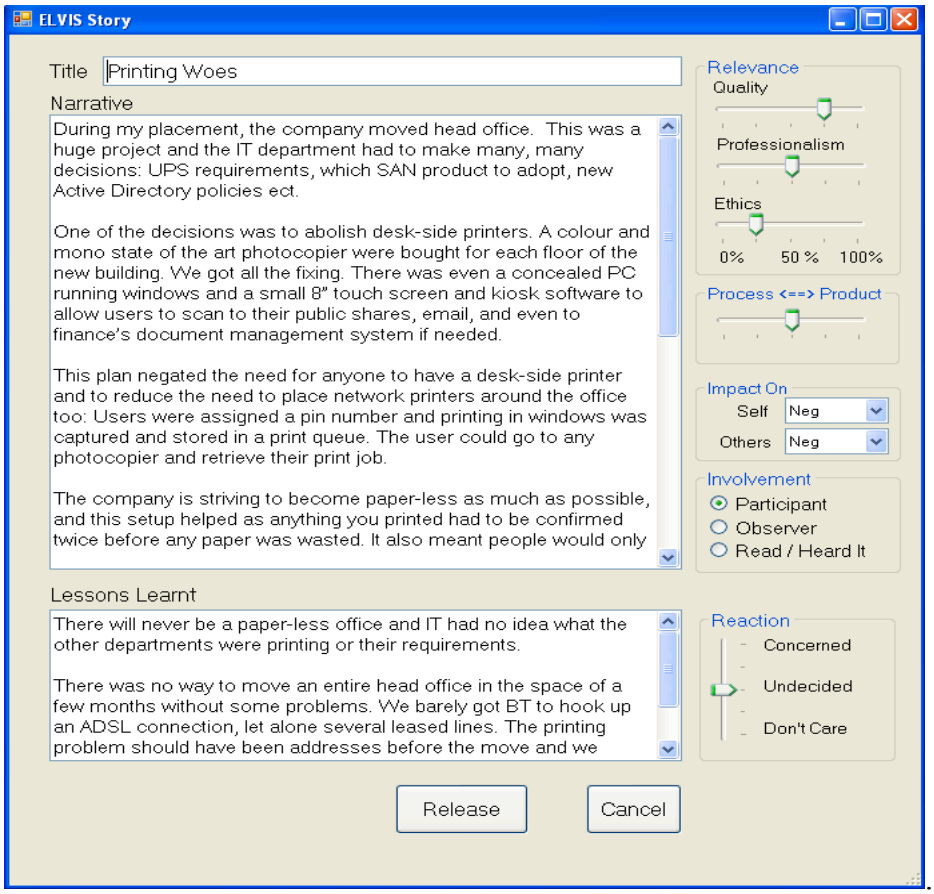
Every component of the ELVIS framework, except the quiet periods of reflection, is supported by software. Wherever possible, this support is via existing packages, like VLE for the online evaluation. However, the majority of activities are supported by custom software. There were two reasons for this: (a) to emphasise the novel nature of ELVIS, on the understanding that all university modules now use VLE, within which many activities use blogs, thus leading to a potentially boring and bland sameness of delivery, not helped by the rather unfriendly interfaces of many VLEs; and (b) the need for extra functionality that ready-made software could not provide.

Shown below, in Figure 3, is the main storytelling screen, displaying a typical story. This screen is used for entering new stories and editing existing ones. It also enables students to set various defining characteristics of their stories, like, for example, relevance to quality, professionalism or ethics; impact on the storyteller and involvement in the story.

The current version of ELVIS software is written in Visual Basic.NET and runs on the faculty intranet. The choice was taken on the basis of the expertise within the project team and the stability of the software environment. The executable files are made available to students via links on the VLE. However, because these executables are not, by nature, web-enabled, the drawback is that students cannot access the software when they are off-campus. The intranet manager imposes this restriction for reasons of access security.

To solve this problem, the next version will be converted into ASP.NET to widen access. This will certainly remove one of the criticisms directed at ELVIS. Also, the RITA project remit is to widen the use of ELVIS, by making it available to all courses at the university and the wider academic community. This is only possible via the Internet.

Figure 3: Story screen



Student Engagement

Initial student response was mixed. The novelty of the storytelling aspect of the framework has been the biggest problem, hindering student engagement, simply for not knowing what to do and not appreciating the value of this learning style. Alterio (2003) suggests that some students may feel comfortable from the onset but others may need time and assistance to accept this type of learning. This is reiterated by Hinett (2002b) who states, "[students] often only appreciated [the value] some time after the process of reflection has begun." Storytelling is a significant learning tool (see, for example, Clandinin & Connelly, 1998; McDrury & Alterio, 2002; McEwan & Egan, 1995; Pendelbury, 1995; and Witherell & Nodding, 1991). It was, therefore, a disappointing start, given the many advantages of the story-telling approach, as suggested by Alterio (2003), such as:

- encourage co-operative activity
- encompass holistic perspectives
- value emotional realities

- link theory to practice
- stimulate students' critical thinking skills
- capture complexities of situations
- reveal multiple perspectives
- make sense of experience
- encourage self review
- construct new knowledge

There is obviously a problem for those students who have not done placement or have not had previous employment and who, therefore, have no first-hand experience of the workplace. The advice to such students was to read the weekly IT publications, like Computing and Computer Weekly, as well as the IT sections of daily newspapers, like The Guardian. The expectation was that, over a period of time, they would pick out events that they could reflect on and write up as stories, in their own words.

For those students who have had placement experience or previous employment, the expectation was that they would reflect on the link between their classroom topics and their workplace experiences, in order to establish their observations and conclusions, which they would then write up as stories. Those observations and conclusions would also be used as contributions to classroom discussions and student-led workshop themes.

A large number of students seemed unable to carry out this task, without direct guidance and active help. They seemed reluctant to “read around” the topics or unable to establish a link between their academic activities and workplace experiences. One conclusion the tutors have reached is that neither their schooling nor the first two years of their studies prepare them for such activities.

Some students did not seem to understand reflection. They were confused about what to record in their notebooks. Also, they did not know how to take notes in lectures. To many, note taking seemed to mean copying down everything that was on the screen and everything the tutor said, instead of recording what was flagged as important. Even those who understood the concept had difficulty putting it into practice. This was thought to be the reason for their initial resistance to developing stories.

This problem became evident when the notebooks were evaluated in week 6 of the first semester (without prior warning) and too many were found wanting. This poor response to ELVIS alerted tutors to the mindset of students and the crucial role of tutors in terms of encouraging students into action. How far that encouragement should go and how often it should be applied is debatable.

Interestingly, the student-led workshop component seemed to be the most popular activity, judging by the rate and speed of participation. All roles were claimed quite quickly, indicating that students had taken ownership.

In summary, student unease was found to arise from:

- A different learning experience, the novelty of which prompted students to question its necessity.
- The removal of the traditional scaffolding of tightly specified requirements.
- A novel approach being taken in a 30-credit module (out of a total of 120 final-year credits) and its potential negative influence on degree classifications.
- An already challenging module, in terms of its topics, activities, and delivery style, the relevance of which is not immediately obvious
- Predictable opposition to anything that threatens the safety derived from familiar requirements.
- The perception of ELVIS being a research tool for the tutors and, therefore, having little or no relevance to their learning.

Lessons Learnt

At the start of the year, students were given time to find their feet and feel comfortable about interacting with ELVIS. It was left up to them to manage their time. As it turned out, the amount of freedom allowed was too much for many students and, instead of learning to adjust to ELVIS requirements, they simply did nothing. The conclusion was that students need:

- Encouragement, in terms of sample stories and support clinics
- Incentives, like “early birds get more marks”
- Milestones, like the first story in by the middle of November, three stories in by the end of first semester, five stories by the end of second semester, and all stories in by the time the workshop is held

Another conclusion was that we should do more to incorporate story-telling as a study mode into our courses from year 1 upwards, because not only will that prepare students for their final year activities but also because, “Dialogue is strengthened when it focuses on lived experiences, familiar contexts and real emotions. Storytelling accommodates the inclusion of these aspects and can assist students to view their experiences from different perspectives” (Alterio, 2003).

It appears that effort is needed by the tutors, in the initial stages of the academic year, to get students to take ownership of the framework, for it to become more student led. Therefore, an on-going email / VLE-announcement campaign is

recommended. Without such a campaign, given the daily pressures the students are under, ELVIS may become invisible.

It is our experience that ownership is certainly the best driver for active engagement and participation; but there is another dimension that cannot be ignored: "relevance," in that if students can see the relevance of their contribution, then they will participate actively. This is what was missing from the stories component. So, another recommendation is to demonstrate to students the relevance of their stories to the overall learning experiences of the cohort. This will happen in the next round, when a library of stories will be available for use. This year being the first run, the students may not be seeing immediately how their stories are being used. Hence, they may have become distanced from ELVIS. After all, seeing the "big picture" motivates students.

It is also essential to provide examples of good and bad stories, derived from effective and ineffective note taking or recording of reflection. It is too much to expect students to run with an alien idea successfully, without first preparing them for it or, put another way, making up for the deficiencies of their early educational years. This was proven to be the case when early feedback indicated that many students were in the dark about the nature of storytelling; so, coaching and sample stories were provided, as a result of which participation rates went up.

In order to encourage students to read the recommended publications, they should be asked to record in the student notebook the name and date of what they read. Furthermore, it is important to monitor the use of ELVIS and emphasise the need for engagement whenever necessary, not unlike advertising campaigns in the media. Students need incentives that reflect current education policy focusing on assessment. Therefore, ELVIS participation is rewarded with a percentage of the overall module mark.

Finally, the period of quiet reflection needs:

- structure, in terms of what students are required to do, within what time frame, and the expected outcome; and
- stimulus, in terms of issues to consider, derived from the session topics, so that they have something to focus on, which may be reduced as time goes by.

Conclusion

ELVIS promotes a mixture of individual and shared learning environments, based on a single, shared repository. At the start of the academic year, the learning is on an individual basis, where students compose their stories and submit them to

ELVIS. Later on, when the workshop teams are formed, the learning becomes shared amongst team members. It is the behaviour of students that define the learning environment and not the behaviour of ELVIS. Even in the early stages, the tutors' perception is that the group discussions were enriched by ELVIS but, at the time of writing, there is no firm evidence of this.

ELVIS has contributed to the ethos of the module which is to create "an environment of learning activities and assessment from which it is very difficult for the student to escape without learning" (Houghton, 2004, p. 5). In spite of the initial problems encountered by many students, subsequent informal feedback is that ELVIS is a novel way of getting students involved in activities that they have not encountered before.

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