ALTEF

WORKPLACED INTEGRATED LEARNING

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Competence development in the workplace State of the Art: A Literature Review

Content

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"Agile Learning" by

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State of the Art: A Literature Review

This literature review (first draft reader) is an account of what has been published by accredited scholars and researchers within the focus area of the ALTEF project. The purpose is to convey what knowledge and ideas have been established on relevant topics, and what their strengths and weaknesses are. The guiding concepts of this literature review are: Work place learning (WPL); Work-based learning (WBL); Work-integrated learning and Agile learning, Problem-based learning (PBL), continuing engineering education (CEE), lifelong learning (LLL). For more details on the criteria, words, structure, frames, databases etc. of the literature search please see enclosure A.

This short draft provides an account of the concepts of WPL, WBL, Agile learning and PBL (primarily the Aalborg PBL model).

Work Place Learning

One of the pioneer researchers within WPL is Stephan Billet, who, for the last decades, has researched employee's learning through their everyday job. It is well known that people can learn through engagement in everyday tasks and social interactions at work (Billet, 2001). These learning processes often occur informally and incidentally, often refereed to as 'informal' and 'incidental learning'. Informal learning can be deliberately encouraged or it can take place despite an environment not highly conducive to learning. Incidental learning, on the other hand, almost always takes place although people are not always conscious of it (Marsick and Watkins, 1990, p. 12). No matter if the learning processes can be framed as informal or incidental this highly contextualised nature of learning arises by engaging in daily working tasks and activities, which are not organised in an external learning environments. Billet has a special interest in how the experiences of employees and the support of the workplace come together and contribute to learning of the employees (Billet, 2006, p. 6).

The specific interest within WPL has been the company as a learning environment contrary to educational institutions as learning environment (Antonacopoulou et al. 2006; Bottrup, 2003). The characteristic element of research within adult learning and WPL is that it is developed primarily through practise, which means specific pilot projects, not through theoretical origin (Elkjær et al. 2006; Illeris et al. 2005). Furthermore, this development through practise has often been investigated at job-floor level among low-paid employees.

Work-based Learning

Work-based Learning (WBL) is another main track, which focuses on the relation between job and work. This, however, has its origin in higher education aiming at developing employees' competences in a collaborative setup between companies, employees and higher education institutions. The concept is not unequivocal and explicitly defined, it is often used in different contexts with different meanings and there is a wide variation in the mix of elements included, but David Boud provides an operational attempt to describe the concept. *WBL programmes meet the needs of the learners, contribute to the longer–term development of the organisation and are formally accredited as university course* (Boud et al. 2001 p. 4). The involved partners in WBL collaborations are: the company,

the employee, and the university academic staff and a long-term collaboration between the partners is often intended. Houlbrook describes, in line with Boud, WBL as a course, which is individually designed to match the competence strategy of a company but at the same time, preferably meet the preferences of the individual employee (Houlbrook, 2011).

When it comes to the role of the employee, or for the matter, who are responsible for setting up the WBL course the literature reveals some differences. The employees are the focal point, since they are responsible for negotiating agreements with both the superior manager and the university (Boud et al. 2001). Here Boud definition difference from others (e.g. Fink et al, 2006; Thomassen, 2015) who account for a WBL model, which has it's starting point from a company strategy and the company management identify the overall theme of the WBL course and negotiates the agreement. But most literature agrees that the WBL course is based on the experiences of the individual employees. The goal of a WBL course can be a degree or a national recognised qualification (Burns, 2003) or the evaluation of the WBL course can be an oral presentation, of the learning outcome, for colleagues within the company to establish some in-company knowledge sharing (Fink et al, 2006).

Contrary to WPL, the learning that takes place in a WBL course can be characterised as formal learning since one of the first activities is to identify learning objectives (learning outcomes) based on the employees' assignments and company strategy. According to Houlbrook 2011, WBL in this form, is heavily reliant on recognition of prior learning (RPL). Unlike most conventional courses, there is no fixed syllabus, core content or essential disciplinary material in the WBL programme. The process of placing work as curriculum in WBL requires that tacit/explicit knowledge is recognised and made operational in relation the theme of the WBL course. *Work is the curriculum* (Boud et al. 2001, p. 4, 7). Another difference is that the university academic staff to different degree are assigned as resource person' (teachers, coaches, facilitators etc.) to the WBL course and to different extents contributes to the learning process whereas WPL is entirely company internal activities.

Agile Learning

Agile Learning generally refers to the transfer of agile methods of project work, especially Scrum, to learning processes. Likewise, Agile Learning proceeds in incremental steps and through an iterative process which alternates between phases of learning and doing. The tutors rather have the role of a learning attendant or supporter (Longmuß et al 2016). In a narrower sense, it is intended to allow competence-oriented, media-based learning in the work process within companies (see e.g. efrontlearning.com). Beside this, the term can take several other meanings (see e.g. edutechwiki.unige.ch) and is also often used within E-Learning and Online Environments (e.g. Masullo et al 2005, Noguera et al 2015).

Background

Scrum is understood as a framework for project and product management, in particular for agile software development. Scrum employs an iterative, incremental approach to optimize predictability and control risk. It has been developed from the experience that many development projects are too complex to be included in a full-scale plan, and an essential part of the requirements cannot be fully understood or defined up front. In order to eliminate these ambiguities, work is broken into actions that can be completed within timeboxed iterations, called sprints - with clear goals and regular

feedback loops. During a sprint, progress and interim results are monitored in short daily meetings. At the end of a sprint, the results, the working process and the cooperation are reflected on - and a new interval begins (Schwaber and Sutherland 2017).

Agile Learning in Companies

<u>Requirements:</u>

The framework of Scrum can be well adjusted to the requirements of companies for a dynamic, workplace-integrated competence development and the subsequent frequency and intensity with which employees have to educate themselves further and acquire new skills. As complexity and dynamics in the internal and external specialization and collaborations increase the need for training and competence development increases as well. In terms of competence development, organizations therefore have concrete needs that are not met well by classical forms of qualification (e.g. seminar courses, continuing education courses), namely:

- Reduce the time it takes an employee to acquire the necessary competences to do their job in the most efficient and effective manner;
- Change the learning context rapidly and in response to the real world;
- Facilitate knowledge sharing within an organization;
- Support a soft failure environment where mistakes have no impact on the real world, thus promoting a willingness to engage in measured risk taking, focused on achieving a high level of polished performance in the real world (Hansen et al 2009)

There is a need for the integration of knowledge and content management with collaboration technologies and for developing a new (online) manufacturing training methodology in order to train and build the manufacturing workforce of the future (Masullo et al 2005). Such learning environments and learning processes have as requirements:

- *High scalability*, to enable qualification measures from a few hours to several hundred;
- *Content adaptability*, to include new topics as quickly as possible;
- *Connectivity* to existing organizational structures and software infrastructure in order to start with little effort (Höhne et al 2017).

So far, however, there are hardly any suitable continuing education formats for this need. One answer to this is the Agile Learning approach with its flexibility in relation to all three above mentioned requirements. In accordance with Scrum and established psychological findings for an effective pursuit of goals (Gollwitzer and Oettingen 2012), Agile Learning divides an extensive (learning) process into individual, manageable learning phases. Here, too, the three pillars of Scrum of transparency, verification, adaptation apply.

<u>Key Elements</u>

The key elements of Agile Learning in companies are:

- Teams of peers with similar development goals and a broad spectrum of backgrounds
- Coaches (internal / external) to support the learning process
- Company stakeholders (management, human resource department, etc.) represented by a sponsor ("product owner" in Scrum).

- Learning objectives which are broken down within the team into personal learning goals.
- Working on tasks from the actual working context
- Sprints to reach sub goals / milestones. The coaches will closely guide this process
- After completion the results will be presented to the project owner and be verified by him / her (Longmuß and Höhne 2017)
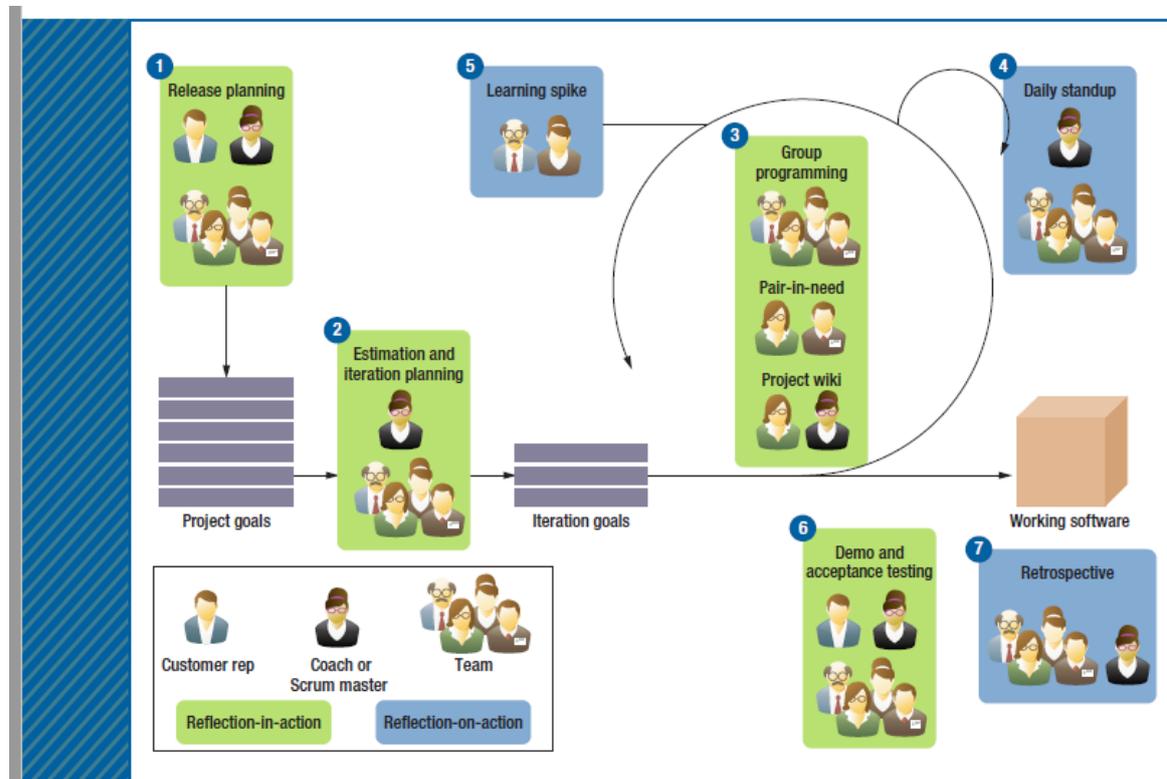

FIGURE 1. The Reflective Agile Learning Model (REALM). Standard and adapted agile practices with implicit reflection-in-action opportunities are depicted in green; learning-focused agile practices with explicit reflection-on-action opportunities are depicted in blue.

Source: Babb et al 2014

Roles within Agile Learning:

Parallel to Scrum, three roles can be described, which have slightly different tasks in Agile Learning.

Sponsor ("Product Owner")

- Defines the learning field and determines a suitable project
- Creates the organizational framework
- Is an liaison person into the organization
- Receives the technical learning progress

Coach ("Scrum Master")

- Technical, didactic and methodical support
- Moderate the process and guide the reflection
- Support in the processing of learning objectives

This role may be supplemented by topic/issue-specific experts

Team

- Personal learning goals in sprints
- Collaborative, mostly digitally supported collaboration
- Regular joint reflection on the learning process
- Personal, social and professional development (Longmuß et al 2017)

Agile Learning in University

In agile teaching and learning, students take on the role of the client; the agile software development process in which the client is involved is replaced by the learning / teaching process with students and tutors as actors; the increments that implement new functionality in short cycles correspond to the continuous increase in students' abilities in the agile learning / teaching process (Meissner and Stenger 2015).

Agile methods can be incorporated into courses both as content and as the working method for students. Agile Learning implies that learners create content and develop skills alongside teachers in a collaborative yet competitive environment mediated by technology. The role of the teacher is centered on facilitation and project direction from an informed perspective. Learners become self-directed, team-oriented, and individually resilient lifelong learners. A study on an implementation of the agile method into an online higher education context showed that the agile strategies incorporated into project-based learning facilitated team regulation and project management (Noguera et al 2018).

Problem-based learning (The Aalborg PBL model)

Many attempts have been made to define the concept of problem-based learning (PBL) but one of the pioneers was Howard Barrows, who in the late 1960's was involved in the early stages of the development of PBL at McMaster University in Canada. Barrow defined the concept in terms of specific attributes as being student-centred, taking place in small groups with the teacher acting as a facilitator, and being organised around problems (de Graaff et Kolmos, 2003, p. 657). In Denmark the problem-based and project-organised model was developed based on ideas from among others Illeris, *who formulated the principles of PBL as problem oriented, project work, inter disciplinarily, participant directed learning and the exemplary principle and team work* (Kolmos et al, 2004, p. 10).

The Aalborg PBL model is a problem-based and project-organised model, which has gradually developed at a profession-based level, showing that the educational ideas are alive and well at the decentralised departments, and that the educational model is integrated in relation to the various professions (Kolmos et al. 2004, p. 9). Although the educational model works at Aalborg University it is still important to make continuous improvements to increase the students' learning outcome and adapt the educational theories to new types of young and adult students. The continuous improvements are a part of the teaching and learning culture at Aalborg University, which also was the driving force in implementing PBL as an approach for continuing education. Companies work on solving professional problems every day and often this problem solving work is organised in groups or teams, very similar to the principle of the PBL model. However, the goals are different. The university students use the problem as the means for academic learning where the employees use their 'academic' skills to solve the problem. The goal at the university is learning, where the goal in a

company context is problem solving. Nevertheless, the principles of PBL are to be found in a company context.

It is important to recognize that the principles of the Aalborg PBL Model are by no means static or contextually isolated but should always be interpreted in the light of the broader context in which the model is to be implemented and applied. The principles, which are acknowledge by Aalborg University are:

- Problem orientation: Problems/wonderings appropriate to the study program serve as the basis for the learning process.
- B) Project organization: The project stands as both the means through which the students address the problem and the primary means by which students achieve the articulated educational objectives. The project is a multi-faceted and often extended sequence of tasks culminating in a final work product.
- C) Integration of theory and practice: The curriculum, instructional faculty members and project supervisors facilitate the process for students of connecting the specifics of project work to broader theoretical knowledge. Students are able to see how theories and empirical/ practical knowledge interrelate.
- D) Participant direction: Students define the problem and make key decisions relevant to the successful completion of their project work.
- E) Team-based approach: A majority of the students' problem/project work is conducted in groups of three or more students.
- F) Collaboration and feedback: Students use peer and supervisor critique to improve their work; and the skills of collaboration, feedback and reflection are an important outcome of the PBL model. (Barge, 2010)

Looking into the teacher–student relationship at any level inside or outside the university, '*the banking model',* as defined by Paulo Freire, is still to be found where '*education thus becomes an act of depositing, in which the students are the depositories and the teacher is the depositor (red) … in the banking concept of education, knowledge is a gift bestowed by those who consider themselves knowledgeable upon those whom they consider to know nothing'* (Freire, 2009 p. 72). The teacher-student relationship with the teacher as narrator of a subject and patient, listening students to memorize the narrated content, must be rejected. '*They must abandon the educational goal of the deposit-making and replace it with the posing of the problems of human beings in their relations with the world'* (Freire, 2009 p. 79).

When abandoning the banking model and implementing the posing of problems – in the PBL model, the teachers undertake a different role. *'As university teachers we are masters in our subject field. At the same time, however, we have to be able to organise students' learning processes in a PBL-environment. PBL is defined by practising a student-centred approach with emphasis on students' motivation and learning experiences. Therefore, the concept facilitation is more and more often used as the overall concept for teacher's role and function in the PBL-system'* (Kolmos et al. 2004 p. 10). To define facilitation, Kolmos turns to J. Gregors *"Facilitation literally means,"easing". Its art is in drawing out the wisdom already embedded and lying dormant in the psyche of the learner. Facilitators are people with the skills to create conditions within which other human beings can, so far as is possible,*

select and direct their own learning and development. A facilitator is a "process guide" who works with a group to assist it to achieve a self-defining purpose" The facilitators philosophy informs their approach and its manifested as a concern with the psychological growth of the person" (Kolmos, 2008, p. 10). In PBL, the teachers are facilitating the learning process, which also was adapted to the FWBL where the teaching also is based on facilitation. To be a facilitator of learning Rogers (1967) point out that the most important basic attitudes are sincerity and purity and when the facilitator is an authentic human being who appears as he or she is and enters into relations with the learner without any exteriors, the chance of being successful is greater. Being a facilitator in continuing education is for most academic staff a new role but fortunately they have experiences from facilitating university students at university.

Facilitated Work Based Learning

The FWBL is a novel concept primarily developed within the engineering field and the companies involved as case studies were also engineering companies (Fink 2004; Nørgaard 2004; Thomassen 2015). The basic idea on which the FWBL concept was developed is '*the philosophy of FWBL is to transform many years of experiences with Problem Based Learning into an industrial context'* (Fink et al, 2004, p. 2). The FWBL concept was mainly developed through a European founded, Leonardo da Vinci project (2003-DK/03/B/F//PP-145.311), a project with the title Continuing Engineering Education as Work Based Learning.

From the early case studies, FWBL has been described as a course for '*individuals/groups of employees in a given company who in co-operation with the university establish a training programme where the employees at their work continuously go through a well-defined and tailor-made learning process. The training programme is facilitated by teachers from the university and if possible, based on relevant development projects in the company'* (Nørgaard et al. 2004, p. 2).

The argument that the PBL model can be transferred to an industrial context as an approach for establishing a learning process with the employees, is that the point of departure both in the university context and the company context is problem solving (Fink, 2001, p. 4), as illustrated below.

Learning by Problem solving	*Engineering Problem solving*
- The problem is a tool - Learning is the goal	- Professional skills are the tools - The goal is to solve the problem

Figure 1.1: Fink's Illustration of problem solving

The FWBL Process

FWBL can be described in different continuing phases (Fink et al, 2006, Thomassen, 2015). However, the content of each phase is not unambiguous for all FWBL programmes as the distinctive mark of

FWBL is precisely their individualities. FWBL can be characterised as a partnership between three partners - the company, the learners and the university. This partnership is very important for the success of the FWBL programme. All partners are equally responsible for the programme, which means that commitment from all is essential.

The process of FWBL does not follow a rigid scheme such as a standard five-day course. This learning process will 'normally' run for more than half a year and often much longer depending on the extent and depth of the learning objectives, the intensity and the time frame of the project, in which the FWBL is incorporated. University researchers and educators typically do not have experience with supervising employees (processional engineers) in their attempt to apply new theories or methods. Therefore, the knowledge and experiences of PBL as the pedagogical model or at least some experience with supervising major teamwork is a prerequisite to be involved as facilitators in FWBL. Furthermore, it is very important that the companies involved in FWBL are organized in teams or project groups.

The FWBL process can be described in 5 continuous phases:

- Contact phase
- Defining the learning objectives
- The learning contract
- Implementation of FWBL
- Evaluation

Contact phase

The contact between company and university is often new for both parts, or at least the situation might involve new people. To ensure a fruitful collaboration, it is very important to make sure everyone is involved and in agreement. Therefore, the time used on harmonising wishes, expectations and requests is often very well spent.

Defining the learning objectives

The process of defining the learning objectives is essential to the success of the FWBL course. The academic staff member will, in dialogue with the strategic leaders, establish a very precise description of the learning objectives. This description will partly be based on what is needed and in alignment with the company strategy and partly on the preferences of the employees. Based on the learning objectives, the academic staff members will carry out interviews with each individual employee to establish his or her competence level in relation to the learning objectives.

The learning contract

The learning contract is prepared in agreement with the outcome of the previous phase. The learning contract is negotiated and signed by all three partners to create a feeling of ownership and to commit all on an equal basis.

The learning contract will as a minimum consist of:

- A description of the theme or the project to which the learning course is connected
- A definition of learning objectives

- An agreement on the methods
- An agreement on the time frame
- A definition of the success criteria for the learning process
- A description of the process and the evaluation

Implementation of FWBL

When the learning contract is signed, the FWBL course is ready to begin. The contents, scope, professional area and time frame of the FWBL course will depend on - what was agreed upon by the three partners. In an attempt to integrate the learning in the organisation, the training will take place in the company. The facilitator (academic staff member) from the university will give face-to-face facilitation to the employee and will continuously make sure the learning is in progress and in accordance with the learning contract. It is very important that the facilitator (academic staff member) is not a consultant with the intention of helping the employees to solve their problem. Rather, the facilitator will focus on theories and methodologies to help the employee solve their problem and find new solutions to their everyday work.

Evaluation

Evaluation will have two targets. Firstly, to ensure quality of the FWBL course – the process and secondly, to make sure that the learning objectives are accomplished. The FWBL process will be subject to an evaluation through the whole programme. The purpose of this evaluation is primarily to ensure the quality of the programme and if possible and/or necessary to modify the programme and the contract. The evaluation of the learning objectives will be in agreement with the description in the leaning contract. If the employee is going to earn credits (ECTS) by the learning process, a formal assessment must take place. Otherwise, the evaluation must give evidence to indicate that the learning objectives have been reached. The employees can as part of the evaluation give an oral presentation for his/her colleagues of this learning outcome to establish some knowledge sharing within the company.

To further develop the concept for FWBL, more practical experiences is needed. Since it turned out to be a very complex model to implement in practise. '*The philosophy of FWBL is to transform many years of experiences with Problem Based Learning into an industrial context'* has been obtained with the FWBL model but certain conditions must be present for FWBL to be successful.

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Enclosure

Search Databases AND Overall criteria	ERIC 2000 - 2017 Peer reviewed Adult education English
Search Words and order	work-based learning OR work based learning OR WBL OR work-integrated learning OR work integrated learning OR work place learning OR work-place learning OR workplace learning OR agile learning AND problem-based Learning OR problem based learning OR informal learning OR in-formal learning OR Practise AND continuing education OR lifelong learning OR continuing engineering education OR Continuing professional development results 148 documents (papers)
Search Databases AND Overall criteria	Research Library 2000 - 2017 Peer reviewed Scholarly journals English Europe Studies, higher education, Colleges & universities, education, innovation
Search Databases AND Overall criteria	work-based learning OR work based learning OR WBL OR work-integrated learning OR work integrated learning OR work place learning OR work-place learning OR workplace learning OR agile learning AND problem-based Learning OR problem based learning OR informal learning OR in-formal learning OR Practise AND continuing education OR lifelong learning OR continuing engineering education OR Continuing professional development results 226 documents (papers)