Towards a Framework for Re-conceptualization of Work-integrated Learning: an ontological approach

Abstract: The concept of Work-integrated learning (WIL) is very closely connected to the concept of purposefully designed curriculum. The main focus is on conducting a range of rigorous approaches to integrate theory with the practice. The existing view of the WIL emerged out of the theory of employability. WIL has been traditionally viewed as a strategic merely curriculum design rather than adopting a Whole-organization approach to effective leadership theory–practice symbiosis (LTPS), which we advocate. Such an approach is useful in enhancing an awareness to consider concerns and interests of all stakeholders that are involved in the multiple initiatives pursued in higher education institutions. But it requires fundamental rethinking and radical design of WIL-inspired educational processes such as course design. Rethinking implies approaching WIL ontologically. Depending on which extent the concept of WIL has been perceived by universities worldwide, it has been thus viewed and implemented from a diverse spectrum of perspectives. First, we discuss the implications for the existed conceptual differences. Thereafter, and inspired by the main philosophical assumptions underpinning a Whole-organization approach to WIL, we propose and thus thoroughly concretize a framework which we call Work-related Educational Activities (WREA). The model which is the theoretical foundation of WREA consists of a category of several components. After identification of the main components of the model, we adopt an ontological approach to the reconceptualization of WIL. The aim of this paper is twofold. Firstly, to demonstrate how University West in Sweden views WIL, which is its newly announced research profile. Secondly, an attempt to re-conceptualize WIL by conducting an ontological approach to WREA.

1. Introduction

The aim of this paper present-at-hand is twofold. Firstly, to demonstrate how University West in Sweden views WIL, which is its newly announced research profile. Secondly, an attempt to re-conceptualize Work-integrated Learning (WIL) by conducting an ontological approach to what we call Work-related Educational Activities (WREA). Inspired by the main philosophical assumptions underpinning a Whole-organization approach to WIL, we propose and thus thoroughly concretize WREA. We view WREA as a proposed framework for program design. The model which is the theoretical foundation of WREA consists of a category of several components. After identification of the main components of the model, we adopt an ontology-based approach to the reconceptualization of WIL. The ontology was designed on the basis of mostly the current WIL-oriented literature review, ideas, and hands-on experience. Many components of the framework have been previously addressed by WIL-oriented researchers, but our discussed ontological approach establishes the basic structure of the framework and is intended to keep stakeholders informed as the framework is developed.

The main purpose of many WIL-oriented education programs offered by universities is to provide a profession-oriented education. While some programs are designed for and meant to specific professions such as teachers, doctors, nurses, others, such as economics, information systems and computer science, have a strong work life orientation without aiming at a specific profession. Also in other programs there might be elements of orientation towards work-life. The universities use terms such as work-oriented learning, life-long learning, work-integrated learning, experience-based learning, vocational-training, and experiential learning to describe aspects of the relation between work-life and university teaching. In other words, to emphasize the integration between theory and practice. As Bennett (Bennett, 2009) reported: *What is one institution's 'internship' can be another's 'co-op', 'practicum' or 'field experience', with practices, procedures, desired outcomes and perception of the experience differing from one part of the world to another, from one higher education institution to another and, even within individual institutions themselves* (p. 1). Besides the lack of consensus on a unified term for Work-integrated learning, Bennett (Bennett, 2009) calls for a specific ontology for WIL which as he says: *The lack of a specific ontology for WIL can lead to the problematic international – or even single institutional – benchmarking of 'best practice' WIL activities and the ability to effectively transfer this practice from one program or institution to another* (p. 5). Therefore, this article is a first step in the process of creating such needed ontological framework/(s).

As the University West in Sweden is claiming it is the first university in the whole entire world to declare Work-integrated Learning (henceforth WIL) as its educational profile, it thus implies a range of fundamental alternative approaches to reorganization its traditional approach to operationalizing the concept of WIL. To reorganize its entire educational organization it thus requires a Whole-organization approach to the particularly curriculum design. Any curriculum design needs to be developed based on: partially a range of the current existed WIL-oriented rigorous Teaching-learning and organization theories, approaches and frameworks; and partially considering multiple issues such as how to build a pleasant educational environment yet giving emphasize to democratic values…and encouraging active student engagement in   the lifeworld of research-oriented WIL and similarly Work-oriented WIL.

The University West emphasized on the importance of integrating educational theory with practice at two levels of (1) offered courses/programs, and (2) workplaces out there in the world of, hopefully, situated learning experiences. According to the official documents published by the University West, the basic assumption is that knowledge is created throughout the whole society. The approach is towards processing advanced knowledge as a result of interaction between academia and the world of work. The main focus is on learning through active exchange of knowledge, reflected action and committed participation of the whole organization. Besides having announced WIL as its educational profile, the University West's recently own established research school runs several of its doctoral programs/courses inspirited by the fundamental philosophical ideas underpinning WIL. One of those PhD programs is Informatics. Researchers at University West such as Svensson (Kjellén & Svensson, 2014; Svensson, 2003, 2004; Svensson & Östlund, 2007) are working with WIL-oriented research. However, it'll be very interesting to see what University West can contribute to the WIL community, especially when WIL is its officially announced educational profile for the whole university.

2. Method

As the choice of considerably relevant research methodology for this paper is concerned, we have thus conducted content analysis mainly because of systematically and thematically/purposively analyzing the selected literature. To achieve that purpose, we have used the software NVivo (version 10). The content analysis comprises several stages. The aim is (Zhang & Wildemuth, 2009) to condense raw data into categories or themes based on valid

inference and interpretation. This process uses inductive reasoning, by which themes and categories emerge from the data through the researcher's careful examination and constant comparison (p. 2). The content analysis is widely viewed as a qualitative, quantitative, and mixed methodology for analyzing text data in a systematic and rigorous way (Hsieh & Shannon, 2005; Marsh & White, 2006). The 'conventional', the 'directed', and the 'summative' are currently three approaches to the application of content analysis (Hsieh & Shannon, 2005).

However, all of these approaches are used to analyze the materials (both of qualitative and quantitative natures). One of the main important aspects of content analysis methodology is the aspect of inference. It means the researcher uses analytical variables (Marsh & White, 2006), or a set of rules of inference, to move from the text to the answers to the research questions. The two domains, the texts and the context are logically independent, and the researcher draws conclusions from one independent domain (the texts) to the other (the context) (p. 27). An additional Software which we used for the purpose of handling references was EndNote X7. From EndNote, we imported the collected documents/articles (N=207) into NVivo. One very useful function of NVivo is 'QUERY' which enables thematic searching of concepts/terms such as learning. As it is shown on Figure 1, we used a query to see what the top 50 most frequent used words were. Thus, Figure 1 shows what is called 'WORD CLOUD'.

Figure 1: Word cloud of 50 most frequent used words

As it's shown in Figure 1, the center of those most frequent appeared 50 words is the term 'learning', which is not surprising. Because of the space considerations, we omit the rest of the analysis description. But having said that, and besides we have knowledge of both content analysis technique/methodology and the software NVivo, we are aware of the

importance of being trustworthy. The 'trustworthiness' (Elo et al., 2014) is often an issue when doing qualitative content analysis because of the risk for defective data collection method, description of the employed relevant procedures, and likewise the 'what' and the 'how' aspects of the conducted analysis. However, Elo et al., (p. 2) have a solution to as they say: "Trustworthiness in the Preparation Phase in Content Analysis Study". However, during our purposive content analysis of frameworks, we found that there are a range of particularly curriculum frameworks, which some of them were fully developed and the rest in-the-making. Some of those frameworks are mentioned in section 3 of this paper.

3. Related Literature

Because of the occurrences of important terms such as (1) 'WIL-integrated Learning', (2) 'concept', (3) 'framework', and (4) 'ontology' and particularly they have been used in a vast range of WIL-oriented academic literatures/contexts, it's therefore a necessary condition for virtue that we first clarify what do we mean by these terms. Before we shall continue to focus on developing the main idea of this paper present-at-hand, the rationale behind starting with clarification of those mentioned terms is notably the lack of consensus among researchers and thus the inevitable confusions that have emerged when some researchers. With this in mind, the term 'Work-integrated Learning' (henceforth WIL), which has evolved since its introduction, has many synonyms (Bennett, 2009). It has thus gone through a transformation process of synonym-making consequently resulted in currently existed multiple synonyms, each used by researchers and practitioners worldwide. However, because of the space considerations, we present only these few randomly selected synonyms for WIL, which are: *experiential learning* (David Allen Kolb & Fry, 1974); *workplace practices*; *in-service training; internships*; *practica* (Orrell, 2004); *Cooperative & Work-Integrated Education (CWIE)* coined by WACE; *cooperative education*; *a process of human cognition* (Fenwick, 2000); and *co-op program* (Coll & Zegwaard, 2011); pedagogical philosophy.

The global WIL-oriented literature covers many research areas and problem domains. Internationalization of WIL (Gamble, Patrick, & Peach, 2010) is an interesting research area which is recommended to focus on appropriate WIL-oriented curricula design. It has been stressed that WIL programs must be well-managed and well-structured, which have been reported to have positive impact on constructs such as 'generic skills', 'satisfaction' and 'self-efficacy' of PhD students (Freudenberg, Brimble, & Cameron, 2010). Literature of theories, approaches, and research methods is growing also. As an example, 'a relational approach to

scholarship', has been proposed because as the authors argue, conducting such approach will place the time factor as an internal factor in…*measure in which events and practices take place, but as the very core of such practices and events (pp. 299-300)*. The relevancy (Dressier, Cedercreutz, & Pacheco, 2011) of education is an additional issue.

One denominator of all proposed frameworks is the use of theories from multiple well-established academic disciplines and research fields. While theories and approaches have been varied, the main purpose has been to enhance learning through experience. However, less focus has been on the many crucial questions related to the Actor-learner, who inarguably is the main important stakeholder in the whole-organization of higher education. "The relationship between theory and experience, or theory and practice, in expert cognition and learning is a classical topic in the literature on expertise." (Engeström, Engeström, & Kärkkäinen, 1995), (p. 319). We believe that this topic is extremely relevant to the current ever-growing research on WIL. This is because of the multifaceted complex but yet interrelated relationships between 'theory' and 'practice' as two main concepts of WIL. The main question has always been, and will be, how to integrate these two. However, we are interested in those works that mainly deal with the development of frameworks. This kind of WIL-oriented research characterizes by partially the various research domains and partially by the need to re-conceptualizing/re-theorizing WIL. The current literature on e.g., 'learning theories' is a long list. These are (Aymer & Okitikpi, 2000; Baker, 2005; Bakhurst, 2009; Barnett, 2012; Bergsteiner & Avery, 2014; Chalofsky, 2003; Chan, 2012; Clark, 2006; Clarke & Reid, 2013; Corcho, Fernández-López, & Gómez-Pérez, 2003; Engestrom, 2000; Engeström, 2001, 2007; Engeström & Sannino, 2010; Fejes & Andersson, 2008; Hickson, 2011; Higgins, 2011; Hills, Robertson, Walker, Adey, & Nixon, 2003; Krause, 2012; Larrivee, 2000; G. Lee, McGuiggan, & Holland, 2010; S. Lee & Dickson, 2010; Ley, Kump, & Albert, 2010; Martin & Peim, 2009; Peim, 2009; Penttinen, Skaniakos, & Lairio, 2013; Rose, 2012; Roth, 2004; Russell*, 2005; Sandlin, Wright, & Clark, 2011; Schnell, Höge, & Pollet, 2013; Singh & Dali, 2013; Slevitch, 2011; Smith & Worsfold, 2013; Thompson & Pascal, 2012; Weaver, Robbie, Kokonis, & Miceli, 2013; Woodall, Hiller, & Resnick, 2012) some of the selected theoretical works that we can use to build frameworks pertinent to e.g., curriculum, teaching-learning, theory-practice, theory-experience, student-workplace, and experiential learning (David A Kolb, 2014). Particularly the 'activity theory' (Engestrom, 2000; Peim, 2009) is one of those main rigorous theories that we believe is appropriate to be used when creating curriculum frameworks.

4. Creating an Ontological Framework

An ontology is an accepted set of concepts and relations between them, used for describing a certain piece of reality (Aymer & Okitikpi, 2000; Fensel, 2001; Mosnik, 2010). The traditional way of creating an ontology is to build on a common hierarchy. This method is suitable for concrete entities where it is possible to define a coherent principle for each. In 'Being and Time', Heidegger (Heidegger, 1996) approaches the mundane world from an ontological approach. One of the main themes in his philosophical discussion is the relationship between the known and knower. Heidegger argues such a relationships depends on how deep the knower can reveal the essence of the thing under his/her investigation.

Additionally, Heidegger is relevant even today when the crisis of higher education is concerned (Thomson, 2001). What exactly an ontology is depends on each community of practice its own definition and adaptation of the original term which comes from philosophy. In philosophy, it refers to the study of being or existence. The main relevant questions pertinent for such a philosophical view of ontology are simply to know (1) what is the universe made of? (2) how is the universe built? (3) why is the universe built? (4) when did the universe took shape?, and (5) where are we going? All these questions show one's ontological view of the existence. But in computer science community, or in Information System Community, the use of ontology has emerged in relation to the development of the artificial intelligence field. For frameworks, such as the one we will discuss more later in this paper, it is more suitable with some sort of semantic or conceptual network (Sowa, 2006).

As it's shown in Table 1, we have chosen a more general concept termed Work-related Educational Approaches. As we shall discuss later in this paper, the concept WREA indicates a set of aspects of professional knowledge in the educational/academic learning environment. As it is shown in Figure 2, the approaches are ordered in increasing degree of WREA which is an intuitive dimension. Another dimension can be deduced from degree of 'Practical usefulness' of the knowledge. Here we name it the theoretical dimension, which indicates theory and practice as the two opposite poles. The third dimension deals with complexity. Working-life often sees academic education as simplification and vice versa. In Fig 2, the dimensions form a space in which a specific education can be placed, we have dedicated eight different types of education, where the green bullets indicate low WREA workload and the blue bullets indicate high WREA workload. Some examples of what the different bullets could mean are given here:

Bullet 1: Basic set theory in database theory, binary number system

Bullet 2: Describe a simple business process from a constructed case
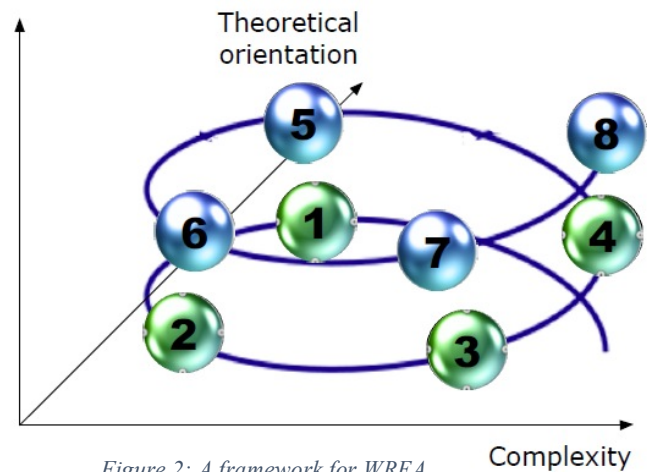
Bullet 3: Adaptation of SAP in lab environment

Bullet 4: Lecture in Philosophy of Science

Figure 2: A framework for WREA

Bullet 5: Description of climate impact of various stakeholders

Bullet 6: Experience and describe simple business process through field studies

Bullet 7: Studies at companies involved in complex statistical problems

Bullet 8: Work place training and COOP

It has been reported (Leong & Kavanagh, 2013) that a similar model has been proposed. The mentioned similar model was adopted for teaching accounting. The dimensions were, however, only two: one complex or simple competence and University vs workplace based. They described a pattern such as the blue path in the Figure 2, where a program starts with simple theoretical modules/moments with low degree of work relation and ends with complex, theoretical modules with high degree of work relation.

We believe that the path can look very different in different subjects but it expresses a progress in the education. As an example, we can look at Figure 3 to describe the undergraduate program in information systems at the University West. It starts with some introductory courses that demonstrates the complexity of the area. After that, we have a course in work process description where the students should describe real processes in working life. As Nr. 3 indicates, we have some courses about the information systems of the enterprises (both private and public) and how they match the processes. We have programming and databases (Nr. 4. & Nr. 5) and systems integration, from a rather theoretical point of view. Nr. 6, the thesis, is usually carried out in a company. Since WIL is considered as a profile for University West, as many courses as possible should be on the high end of the WRL. This is hard for an introductory course, but concerning programming and databases it is

easier. In fact we use cases from Nr. 3 in the database course, so Nr. 4 is a bit up on the WRL ladder.

4.1 **The Ambiguous Concept of Work-Related Learning**

At many universities an idea has become widespread and important during the past four decades; the idea of somehow including certain aspects of professional/vocational training and training in the job as well as in the curriculum of tertiary (third level/third stage) academic education (university study programs). But the focus and control of such an idea still remain to a high degree at a university (Holtzhausen & Du Toit, 2009). In this paper, we give this idea a general name and a neutral name: Work-related learning and WREA. We would like to explain why we consider the restriction "focus and control still remain to a high degree at a university" for WREA as an absolutely necessary. There are two reasons: first, the quality of the practices used in organizations; and second, and the half-life period of the institutional/taught knowledge.

Regarding "practices", that is, the way how theoretical knowledge is applied to practical problems, it is the task of an academic program to teach the students high quality practices, the best practices according to the state of the art of a subject (discipline). Practices used in organizations, however, can have very different quality. Some organizations follow the objective to only use best practices and even try to improve them. Other ones still do not use them, but (from a short term perspective) cheap mediocre and bad practices, such as the well-known "quick and dirty programming" in computer science where an IT project is not embedded in a complete software process. The danger, which can arise from a high influence of (arbitrary) organizations on larger parts of an academic program, becomes evident in the case of students who already work in organizations, for example to pay their tuition fees. If the organizations use best practices, the students will be successful at the university. If not, the students will criticize professors for being too theoretical and not experienced in organizations and will not develop a good feeling for the quality of practices. Regarding the half-life period of knowledge, universities have to teach knowledge which either will still be valid in some decades (like fundamentals of mathematics, modeling, epistemology etc.) or which forms a good basis for life-long learning. In contrast to this principle, organizations often are keen on short-term knowledge such as virtuously handling the current versions of some software tools.

There are special types of universities in several countries which support WRL (Work-related Learning), such as: the Universities of Applied Sciences in Germany, Austria, Switzerland, Liechtenstein, polytechnic universities in Anglophone countries, the IUPs (Instituts Universitaires Professionnalisés) in francophone countries, and recently all the universities in Australia etc. Some of the universities persecuting similar goals in the field of WRL have joined specific international organizations. A well-known one is WACE ("advancing cooperative and work-integrated education") which University West is one of its member. Besides WACE, there are additionally other universities also follow some WRL paradigm, such as McCormick School of Engineering (Northwestern University) in the USA. Different universities can interpret WRL in (at least slightly) different ways. They can call it WIL or prefer using some synonyms. In fact, currently there exist slightly different approaches and quite different terms of which we show some examples. What we cannot and will not do, is a complete elicitation of WRL approaches and terminology worldwide.
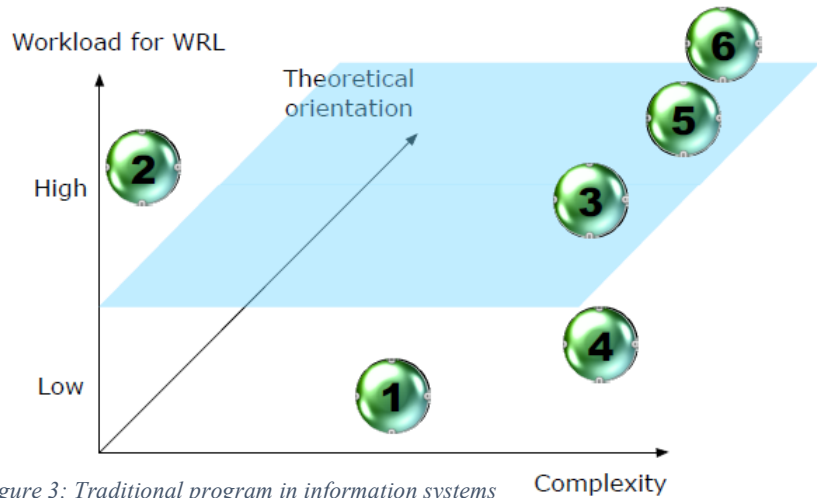
Figure 3: Traditional program in information systems

Table 1: WREA approaches at University West, Sweden

Types of WREA	Descriptions
Cases, close to practice examples, examples from enterprises, anecdotes	The example/case is partially constructed but could occur in different organizations.
Real exempels	True and real examples from real enterprises
Fictional case studies	One of the teacher completely contrived and complete case in order to illustrate a specific problem
Vignettes	Case is incompletely described but is about a typical situation. Students take advantage of field studies to find out what is missing.
Scenarios	Real phenomena described in narrative form.
Rare, improbable, reality-based Scenarios	Scenarios about what could happen if something is unlikely does happen. Important, e.g., in security
Role plays, business games, plane games, simulation	A number of characters are described, together with a scenario. On this basis, learners simulate a more or less predetermined course of events
Tool management, laboratory work	Ability to manage tools that are relevant to work- life
Project workshop	Conducted in collaboration with external enterprises
Guest speakers from professional life	Tells about work-life, which is confronted with the academic theories
Work-life academization	A teacher goes to the business and confront it with the academic approaches and requirements.
Field studies	Students studying a phenomenon through field trips or short internships. Mentors from work are sometimes linked to these studies.
Workplace training	Students are practicing in an appropriate selected organization where regular meetings take place between the tutor and the student at the campus. The training is scored but not paid.
COOP	Students who are interested in the work part of the education, is given one year opportunity to work in an organization, or in a field of interest. Meanwhile. The interested student receives a considerably good monthly salary from the workplace. The tasks are given by the organization but there is a link back to the college. No score. This type of WREA is very popular.

4.2 **Work integrated learning: definition in the framework**

WRL is a broad concept and covers as we have seen, almost every meaningful contact between universities and work-
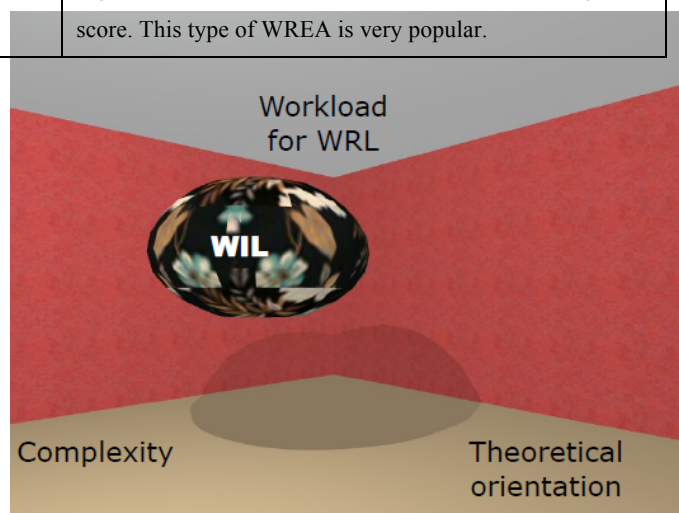

Figure 4: WIL as a shape in the ontological space

life. Work-integrated Learning is both complex and comprises of many components, since it means a true integration between learning and working. WIL is based on practices in real world and theoretical, academic knowledge. It is both of them, carried out here and now and in the future! Using the framework in Figure 2, WIL comprises of a volume in the space located within certain intervals and dimensions. In Figure 4 this is illustrated as a shape in a room. To determine the shape and its location is another project and requires far more research. Using this metaphor we could even add more dimensions such as one dimension for the direction of the light, another for the texture of the shape (we have chosen a rather complex texture here, to indicate the complexity in the concept itself), a third for the color of the light as described in (Flensburg & Friis, 1999). We also see that WIL is only a small part of the whole WRL-space, especially concerning WRL. Of the types of WRL-learning few qualifies for true WIL. This sharp definition puts very high demands on the academic teaching if it should have a WIL orientation. It must be a close cooperation between work-life and academy, with mutual respect and understanding. In achieving this we think both the staff at universities and employees at enterprises must together educate themselves in WIL. But this is another big project.

5. Discussions and Conclusions

Many education programs in the universities aim at providing a profession oriented education. Some aims at a specific profession such as teachers, doctors, nurses, etc. Others, such as economics and computer science, have a strong work life orientation yet without targeting a specific profession. Teaching in this category of programs has a strong orientation towards the intended work, but there is also an influence from working life to the teaching in the educational programs. This mutual learning process we call 'Work-related Educational Activities' (WREA). We first described different types of WREA, such as fictional case studies, realistic cases, real examples, guest lecturer from work life, simulation, workplace training etc. Then we classified these approaches in three dimensions: degree of complexity, theoretical orientation; and degree of practical orientation. By virtue of doing so, we created a framework for describing different WRL-approaches related to specific types of education. We provided a more precise definition of Work-integrated learning (WIL) and its related concepts, theories, approaches etc. We also identify some typical development paths for study program. The framework was further operationalized to be used for assessing a study program with respect to WIL-aspects. We provided an example of this and demonstrate how it can be used by students and companies for assessing a study program. Because of the ever-

intensifying information-rich workplaces and various multiple demands on the quality of WIL-inspired program curriculum, thus curriculum design/development should be viewed as both tactical and strategic (Patrick et al., 2008) framework. Therefore, it should provide organization and structure to WIL's multiple approaches to experiential learning by assembling standards, guidelines, and practices that are working effectively in higher educational institutions and shedding lights on the essence of multidirectional experiences embedded in workplaces.

While the main aim of a curriculum framework is providing a profession-oriented education, it must be comprised of multiple dimensions …and taken into account the interests and concerns of all involved stakeholders. The framework should be composed of rigorous dominant learning theories and methods. The framework can also serve as a model for international cooperation to strengthen critical WIL infrastructure. As such, it should be thoughtfully well-designed approach to managing the multifaceted complexity of integrating theory with practice. One key actor is the learner/student. Our framework is composed of three parts: the core, the implementation, and the framework profile. The aim of any curriculum design should be to provide a profession-oriented education. Some aims at a specific profession such as teachers, doctors, nurses, etc. Others, such as economy and computer science, have a strong work life orientation without aiming at a specific profession. The teaching in such a program has a strong orientation towards the intended work, but there is also an influence from working life to the teaching in the educations programs. This mutual learning process we call "work related learning" (WRL). In this paper we first describe different types of WRL, such as fictional case studies, realistic cases, real examples, guest lecturer from work life, simulation, work-place training etc. Then we classify these approaches in three dimensions: degree of complexity, theoretical orientation and degree of practical orientation. In doing so we create a framework for describing different WRL-approaches related to specific types of education. Thus, we can provide a more precise definition of work integrated learning (WIL) and related concepts. We also identify some typical development paths for study program. The framework is further operationalized for being used for assessing a study program with respect to WIL-aspects. We provide an example of this and demonstrate how it can be used by students and companies for assessing a study program with respect to work integrated learning.

Acknowledgements

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