

# Is Tacit Knowledge Communicable?

---

by Peter Baumgartner & Isabell Grundschober

## Abstract

In this paper, we will present some ideas on how informal learning could be communicated. Within today's fast changing society, most of our competences predominantly result from an on-going process of experiential learning at our workplace and in other day-to-day activities. So-called expert knowledge is not acquired or constructed in the short time span of our formal or non-formal learning career (school, studies) but during all our (life) activities in which we try to find solutions to challenges. Therefore, this kind of knowledge is not the outcome of arrangements that are particularly oriented to the intention of learning, but is a spin-off or side effect of intrinsically meaningful actions for all persons actively involved in these situations. This leads to the problem, that learners are often unaware of the significance, the depth or the variety of their informal learning.

But how can we judge this kind of personal knowledge in a reproducible and comparable way? We need a theoretically sound procedure to validate informal learning. The validation of informal learning plays an important role when it comes to lifelong learning, as informal learning through the people's professional, social and personal lives needs to be recognized. Successfully implemented validation procedures could act as the missing link between informal workplace learning and formal education and training. In this article, we propose the model of validation used at the University of Chester, considering it to be a useful approach to capture tacit knowledge through reflecting on practical learning experiences.

As a concrete example, we have chosen the professional field of teaching, as this is where we are most experienced and thus more able to substantiate our theoretical claims.

## 1. Introduction

In this article, we apply our theoretical model on validation procedures for informal learning. As an example, we choose the teacher profession. Austrian teacher education for teachers in compulsory schools is facing great transformation at the moment. Legislation and curricula were changed and aligned with the Bologna process. The idea is that after doing their bachelor's degree, teachers start to work while doing their master's studies in the years that follow. Master programs should be designed for this target group, considering and recognizing prior informal learning at the workplace to ensure the quality of the studies.

For this purpose, validation procedures are highly important to identify, assess and recognise knowledge, skills and competences, which were already informally acquired. Successfully implemented validation procedures could act as the missing link between informal workplace learning and formal education and training. Progress has been made in implementing validation procedures, but at the moment only few countries carry out comprehensive validations systems in all economic

sectors (Cedefop, European Commission, and ICF 29). Especially informal learning with its tacit characteristics leads to methodological challenges in validation procedures (Cedefop 16). In this article, we approach potential obstacles to the validation of teachers' informal learning experiences and suggest possible solutions.

First, we outline some characteristics of informal learning. We hypothesise that the results of informal learning could be described by the Polanyian term of “tacit knowledge” and that it cannot be represented completely in a linguistic way. We show that the traditional lesson planning models that are used in teacher education nowadays face a similar linguistic problem.

Based on these results we will draw some conclusions on the design of a validation procedure for informal learning. As a continuing example, we use our own professional experience in teacher training to illustrate the significance and practical implementation of our considerations.

## 2. Making Tacit Knowledge Explicit

### 2.1. Language and the Concept of Tacit Knowledge

After looking deep into the different aspects of tacit knowledge, Michael Polanyi in his magnum opus *Personal Knowledge* (1958, reprinted 1974 and 2013) summarises the essential characteristics with the following, currently celebrated words: “I shall reconsider human knowledge by starting from the fact that *we can know more than we can tell*” (*The Tacit Dimension*, 4, italics are in the original).

As an illustrative example, Polanyi mentioned the recognition of human faces, which is a skill everybody has without knowing explicitly how it works. We are able to describe the different traits of a face. However, this description is not unambiguous and does not account for many changing aspects like the perspective of our view, the facial expression (angry, laughing), or changing characteristics such as getting older or wearing a beard.

Face recognition is not only a paradigmatic example of the fact that we know more than we can tell. It also shows that we are principally able to communicate our knowledge. But to do so, language is not sufficient; therefore, we also need other forms of communication. The police uses a specific method to identify (and therefore recognise) faces by memory. The person who is invited to communicate his or her knowledge commands a repository of pictures of different parts of the face (forehead, eyebrows, eyes, nose, mouth, chin etc.) where each picture representing a part of the face is itself a collection of pictures with different characteristics of this particular face property (for example, a nose could be small, broad, long, snub etc.). In trying out how different pictures of the constituent part of the face interact and affect each other, the witness is finally able to produce a face picture with a strong resemblance to the original. This usefulness of this technique is demonstrated by the software app “Flashface full” by Viktor Widiker (2012).

This example shows that we are able to communicate our knowledge but not with language alone; we also need other means. The philosopher Susanne Langer already pointed out that language has two important restrictions in relation to other symbol systems.

**a) Discursiveness:** Thoughts represented by verbal symbolism – as Langer calls language – has the restriction that only one idea after the other could be expressed in oral or written form.

. . . all language has a form which requires us to string out our ideas even though their objects rest one within the other; as pieces of clothing that are actually worn one over the other have to be strung side by side on the clothesline . . . only thoughts which can be arranged in this

peculiar order can be spoken at all; any idea which does not lend itself to this “projection” is ineffable, incommunicable by means of words. (*Langer 65f.*)

Even if we could divide the face into different parts, it is not the property of these parts that determines the overall appearance of the face to us, but the relation of all the parts to each other. It is an interrelated network of relations that creates the essential characteristics of a face: A “broad” nose is only a relative feature of the face, determined by other parts of the face (e.g. the location and proximity of the eyes, the shape and size of the mouth, lips etc.). These relational attributes cannot be expressed linguistically, as speech knows only the sequential order of words.

b) **Composable semantic units:** Language is composed of semantic units (vocabulary), which are composed by certain rules (grammar) to construct new meanings. It is a general reference, which is constructed bit by bit and which needs to be situated in time and location by “non-verbal acts, like pointing, looking, or emphatic voice-inflections, to assign specific denotations to its terms” (*Langer 78*).

Another example of the limitation of verbal expression was the famous saying by Isadora Duncan (1877-1927) – a well-known dancer in her time – quoted by Gregory Bateson in order to underline the restricted functionality of language. After a performance, Duncan was asked about the meaning of a specific dance, and what she wanted to say with it. She answered: “If I could tell you what it meant, there would be no point in dancing it” (*Bateson 137 and again in p. 464*).

Other symbolic systems like pictures have a multifaceted character which is not divisible and where the meaning is changed or destroyed whenever we try to decompose the wholeness or *gestalt* into different parts. These symbolic systems are total and direct references to the object they represent (*Polanyi, The Tacit Dimension, 18*).

When seeing a face, we are focusing on a comprehensive entity connecting unspecifiable particulars in a way we cannot define. We are not focusing on certain particulars, but rather on the whole appearance of the person’s face (*Polanyi, The Tacit Dimension 24*). Therefore, it is instructive to understand that the example of face (re)composition is just an approximation in two ways: Firstly, it divides the complete experience of face recognition into the experience of playing with different parts of the face and secondly, it uses verbal symbolism as a communication resource either in the thought process of the person trying out different parts of the face or in telling a professional illustrator or – nowadays – a person trained in using the software that chooses and combines the different pictures representing the parts of the face. But even if this method works as a kind of a useful approximation with workable results, there is still a big critique on this procedure not working in the way our mind does. We do not recognise a face by dividing it into different parts, playing around with the different shapes of these parts, and trying out different configurations.

A better example to capture the inherent properties of tacit knowledge may be pattern matching. We believe that pattern matching is a more effective way to understand how the mind recognises faces. Again, this procedure could be easily demonstrated by software applications: They calculate some characteristic features of faces and search through a database of already recognised and defined faces, namely persons’ faces (*Le*). Drawing from the experiences of chess grandmasters, it is estimated that for all kinds of expert performance, an underlying database of pattern is necessary. It is estimated that such a repository consists of at least about 100,000 patterns. But instead of comparing and finding a match through a detached and separated similarity algorithm as with the example of the software above, we follow the philosopher Dreyfus who argues that the human expert is driven by a compelling intuitive perspective, which means that (s)he is cognitively and emotionally immersed into

the situation (Dreyfus 36). This immersion is also called “indwelling” by Polanyi, who understood this intuitive way of acting as a tacit component of knowledge. People use tacit knowledge in a natural, intuitive way, almost like an extension of their bodies. Through relying on their tacit knowledge, they can focus on a specific task (Polanyi, *The Tacit Dimension* 17). The skilled expert often does not know that he or she is carrying out complex actions (Dreyfus and Dreyfus, 13). Usually, a chess player rehearses the games of chess grandmasters to discover what the master had in mind. To understand the skilful performance, the player needs to mentally combine the movements which the grandmaster combined practically. Then, the player needs to combine them in a pattern similar to the master’s pattern of movements (Polanyi, *The Tacit Dimension* 29f.).

## **2.2. Language and Informal Learning in the Teacher’s Profession**

Let us now examine the role of informal learning in teacher training education. We take the Austrian situation as an example because we know it best, but the situation is not very different in other countries. To help students attain their first knowledge on planning lessons, prospective teachers are often trained to design courses in terms of serial additions of various pedagogical components. A typical example is a form sheet for lesson planning, where students have to plan their lessons in a serial timeline, adding different educational components one after the other (Böhm and Klaffke 21). The form itself communicates to the students what elements they have to observe and integrate in their planning. The header tells them to fill in the time, phase, teacher-student interaction, social form and media. There is a short column for notes, which does not fit into the other predefined slots. The form is based on a categorical system with abbreviations so that the narrow columns hold all the necessary information. So for instance, the different teaching phases are divided into getting started, introduction, presentation, teacher’s lecture, discussion, working out, transfer, sum-up.

This model of lesson planning requires a linear sequence of decisions and one immediately feels the limitation of language in capturing the complexity of the teaching/learning situation: Students have to fill in the form one line after the other in a similar way to how one would hang clothes on the clothesline (Tsui 23). There is no interrelatedness between the different actions building up in the filled-out columns and lines. There is no transfer of meaning of an earlier action to a newer one: Each line stands for itself and has no interactions with previous or later actions or situations. The similarity of this approach with the example of face recognition is obvious. The elements of the lesson plan (time, phase, teacher-student interaction, social form and media) correspond to the particulars of the face (e.g. forehead, eyebrows, eyes, nose and mouth). However, while witnesses are able to communicate their tacit knowledge by compiling pictures of face parts, this is not the case in the teaching example. The teacher’s form sheet is just a crude approximation to help teacher novices get their first experiences with lecture planning. Teachers with many years of teaching experiences do not use these kinds of tools to plan their lectures. Expert teachers cannot express their tacit knowledge of teaching with just the form sheet. The most important qualities of a good lesson could hardly ever be verbally expressed. (Kohls and Köppe 196)

Why is this the case? What is the difference between the example of face recognition and the example of teacher training? We suspect that in the case of face recognition, the composable parts consist of pictures that are themselves an adequate form for direct and total referencing (at least of a part of the face), whereas filling out the form line by line only generally references the parts of the situation. To access and communicate the tacit knowledge of expert teachers, we would need a direct and total reference. Even if this reference would consist only of parts, we still would have to compose them to a complete image. We believe that at the moment, we are lacking an adequate symbolic

system that makes the expert knowledge of teacher explicit and transmittable to teacher students, as the skill of the expert unfolds within the action (Quillien 162). Expert teachers are hardly able to distinctively explain their practice, but the complex ideas about their teaching are embedded in classroom routines (Tsui 37). Therefore, we have to settle on the direct observation of the real or (video-) recorded situation itself. But this is cumbersome and costly and it does not guarantee success, as the observed situation is very complex and includes attributes that are not essential and have to be interpreted. Even for this direct observation we would have to develop a way to reduce complexity and to facilitate the process of interpretation.

Let us summarise what we have noted so far:

1. We know more than what we can express verbally.
2. This kind of knowledge is called tacit knowledge.
3. It seems that expert knowledge, which is shaped by lifelong experiences, that is, experiential learning, consists of a tacit dimension and at least partially consists of a huge repository of patterns.
4. To communicate tacit knowledge, we need a different kind of symbolism which is not sequentially ordered and (de)composable like language, but has a gestalt character.

### **3. Validation of Tacit Knowledge**

#### **3.1. The Validation Procedure**

Validation procedures are highly important to identify, assess and recognise the knowledge, skills and competences which were already informally acquired. For the purpose of this article, we shall understand validation as the confirmation, by a competent and legitimate body, that the learning outcomes acquired by an individual have been assessed with certain predefined criteria (Cedefop 16f.). Successfully implemented validation procedures could act as the missing link between informal workplace learning and formal education and training. Therefore, implementing validation procedures is a question of promoting lifelong learning, supporting individual employability, strengthening a country's competitiveness, and linking labour market demands with education and training (Bohlinger and Münchhausen 9f.).

In numerous countries around the world, ideas and challenges appear regarding the development of strategies and systems to validate learning acquired in different settings throughout one's lifespan. Most of the validation procedures focus on formal learning as the acknowledgment of certificates issued by state-recognised educational bodies. Another essential practical application is the translation or transfer of non-formal learning attested by educational organisations that are not part of the formal national educational system. There is not much experience yet with the validation procedure of informal learning.

To find solutions to overcome the obstacles of validation procedures, several EU-projects were conducted to develop and pilot validation procedures in Higher Education, e.g. the VALERU-Project (2013-2016) or more recently, the VINCE-project. Especially considering the refugee crisis and the need of support their inclusion in Europe, validation procedures gain further importance. Many refugees obtained an academic degree and/or have several years of professional experience, but are lacking documentation. The VINCE-project, which started in January 2017, is dedicated to developing and implementing validation procedures, which allow refugees to have their prior learning validated.

The main obstacle of validation procedures for informal learning is that they are strongly determined by the nature of tacit knowledge. Learning through experience primarily results in tacit knowledge, which could easily be adapted to different practical situations, but which is hard to communicate and therefore to validate (Schmidt-Hertha 233).

Therefore, validation procedures for informal learning require the special consideration of several aspects: On the one hand, many people do not remember when and what they have learned informally, as the essence of this type of learning goes without special attention and volition. Informal learning is learning without a special learning intention; it comes unplanned and accidentally without formal educational arrangements. It is essentially driven by day-to-day (working) experiences and could also be called experiential learning. Dewey underlined that education needs to engage with and enlarge the experiences from informal learning (Dewey 12f.). On the other hand, informal learning is entangled with the subjective life experiences of the person, therefore bringing these experiences to light, where they could therefore be validated with accountable objective criteria.

### **3.2. Validation in Teacher Education**

Successfully implemented validation procedures could act as the missing link between workplace learning, and formal education and training systems, which could be especially beneficial for teacher training education, which traditionally has strong links with practice. Still, in the current evidence-based practice of teacher development programmes, less well-articulated forms of knowledge and learning are not as valued and theorized as explicit forms of knowledge (Markauskaite and Goodyear 238). Nevertheless, the teacher's working knowledge, or knowledge-in-action, is likely to be dynamic, experimental and deriving from different situations that are not very coherent or theory-based. Pedagogical sense-making and the creation of meaning is an important point of teaching (Markauskaite and Goodyear 241).

In the Austrian teacher training education, validation of prior (practical) learning is not recognized within its formal education system. One possible reason is that it is difficult to assess if somebody is a "good" teacher, or close to being a good teacher. What is good practice? And how can good practice be assessed? These are also questions which have recently been raised in Austrian teacher training education (Bundesministerium für Bildung und Frauen).

The Austrian teacher education for compulsory school teachers is facing a major transformation at the moment. There were changes in legislation and curricula in accordance with the Bologna process, and the new education system entered into force in the winter semester of 2015/2016. The new system consists of a bachelor's degree with 240 ECTS and a master's degree with 60-90 ECTS, the latter being compulsory for teachers of general education subjects and optional for teachers in practical subjects of vocational education (§8 Abs. 2 HG). The idea is that after completing their bachelor's studies, teachers start to work at the same time as they do their master's in the following years. Master programs should be designed for this target group, considering and recognizing the prior informal learning at the workplace to ensure the quality of the master's studies. For this purpose, validation procedures are highly important to identify, assess and recognise the knowledge, skills and competences that were already informally acquired.

As we have shown, validating these informal learning experiences is challenging and there are manifold obstacles to overcome. Learning through experience primarily results in tacit knowledge, which could easily be adapted to different practical situations, but which are difficult to communicate and therefore validate (Schmidt-Hertha 233). Furthermore, the learners themselves are often unaware of the significance, the depth or the variety of their informal learning (Smith and Clayton 448). Also, it is difficult to diagnose a teacher's skill: A teacher's performance could be assessed in a very cursory

level, but due to the tacit nature of practical knowledge, it is hard to approach the teacher's real skill. Teaching routines and behaviours are just the tip of the iceberg, the visible part of a very complex process, as teaching is engaging "... in a sophisticated and interlocking set of decisions ..." (Jackson 24). Nevertheless, – as we already have said – the explicit linguistic expression of this informal knowledge has to be the basis for its recognition (Schmidt-Hertha 243).

The University of Chester gives an illustrative example of how tacit knowledge could be approached within a validation procedure in higher education. Danube University and the University of Chester closely cooperated in EU projects in terms of work-based learning and validation of non-formal and informal learning; therefore, we gained an insight into Chester's validation model. The validation procedure, which was elaborated at the University of Chester, applies very much to our theoretical considerations. The University of Chester offers Work Based and Integrative Studies (WBIS), which are tailored to the needs of the learners and their workplaces and contain a validated degree that enables learners to negotiate an award title. This way, adult learners obtain credit for previous non-formal and informal learning achievements. The validation model used in Chester is based on a developmental approach to awarding credit, and reflected practice plays an important role within the validation procedure. The Chester model of validation involves following steps (Talbot):

1. Information, advice and guidance: Prospective students come to the university and explain their plans for getting a degree in a certain field.
2. Identification: A Personal Academic Tutor (PAT) counsels them to remember and outline their experiences in order to identify necessary academic skills, which are codified and moulded into curricula, forming part of their desired degree.
3. Assessment: The applicant and the PAT, in a process of "negotiated learning", outline together the necessary competences and determine the gaps the student has to fill as well the tacit knowledge (s)he has to make visible in order to get assessed for validation purposes. An individual curriculum is designed to fit the needs of the applicant. It consists of visiting teaching modules to fill in the gaps and of designing work-based projects to demonstrate the tacit knowledge of the applicant. These projects draw heavily on the past or current experiences of the student and their academic discussion of these experiences with the use of contemporary scientific literature.
4. Validation: The student writes an essay about the project. But this is not just a report describing the work-based related situation and the actions by the student to master a certain challenge or to solve a problem; an essential part of the essay is the reflection of learning through the student's experiences in the light of scientific literature. Using sequential language, applicants try to outline their tacit knowledge by discussing their interventions under academic premises.
5. Certification: This essay can be validated and certificated like any other explicitly expressed knowledge.

We suggest a similar procedure for the validation of the tacit knowledge of experienced teachers, as this procedure seems adequate to approach the teachers' experiential, informal learning in the classroom. This idea was already described and used for many years in the continuing education and professional training of teachers as a kind of research method. Even if validating informal learning was not explicitly addressed, we interpret the research methodology in "Teachers Investigate Their Work: An Introduction to Action Research across the Professions" (Altrichter, Posch, and Somekh) as compatible with our own thinking.

Another approach which conforms with our considerations is linked with Actors-Network-Theory (Latour). This theoretical approach focuses not on the visible facts but on their dynamics in the hidden networks of inter-relationships. Instead of justifying and giving reason for groups, actions, objects and facts, Actors-Network-Theory follows actors in their environment to inspect their group

building process, their interactions and interchanges. According to Bruno Latour, all matters of fact are the product of discussion processes about matters of concern where these facts were scrutinised and challenged. Not only are human actors agencies, but also objects, as they invite humans to certain actions and behaviour. For instance, a door handle “invites” humans to enter or leave the room. It is this hidden fluid dynamics that sociology uncovers and that cannot be interpreted as fixed and visible facts. In a manner similar to our difficulties in expressing tacit knowledge by linguistic means, Latour also struggles with words and their prefabricated static meaning. Most words in many languages designate already fixed objects and events as the result of a frozen dynamic. We are lacking words that refer to on-going processes, and that indicate processes of becoming.

It is therefore necessary – at least for the main languages of the Western hemisphere – to develop symbolic systems that are better able to capture dynamic situations as they are represented by the tacit knowledge that results from vibrant and energy-laden experiences. But in the meanwhile, our proposal to capture tacit knowledge by reflecting practical experiences and learnings could be used as a good approximation. The Chester model of validation, which follows a developmental approach and supports reflective practitioners, could act as a useful approximation to tacit patterns of teaching.

#### **4. Summary and Conclusion**

The main challenge of tacit knowledge is communicating it. Due to its intangible nature, as it is acquired unintentionally and used intuitively, people are not only often unaware of the full range of their skills and competences, but they also lack the means of communication to express all their tacitly acquired knowledge. We have shown, through the example of teacher education, that the current ways of approaching (tacit) teaching skills are not adequate. Form sheets for lesson planning, which force a linear sequence of decisions, could neither express the own past experiences nor the complex situation in the classroom. Verbal expressions are limited, as the skill of teaching unfolds within the action and a different symbolic system is necessary to, in some degree, communicate tacit knowledge.

The Chester model of validation follows a developmental approach, which is able to capture learning in a multifaceted way. It could act as a useful approximation to make tacit learning deriving from informal learning experiences explicit. Nevertheless, a notational system, which expresses the wholeness or gestalt of educational settings, needs to be developed to further support the communication of practice from experts to novices in teacher education and to facilitate the validation of informal learning.

#### **5. Bibliography**

Altrichter, Herbert, Peter Posch, and Bridget Somekh. *Teachers Investigate Their Work: An Introduction to Action Research across the Professions*. 2nd ed. Routledge, 2013. Print.

Bateson, Gregory. *Steps to an Ecology of Mind: Collected Essays in Anthropology, Psychiatry, Evolution and Epistemology*. New edition. University of Chicago Press, 2000. Print.

Bauer, Reinhard. ‘Didaktische Entwurfsmuster. Diskursanalytische Annäherung an Den Muster-Ansatz von Christopher Alexander Und Implikationen Für Die Unterrichtsgestaltung’. Alpen-Adria Universität Klagenfurt, 2014. Web. 1 Feb. 2016.



Bohlinger, Sandra, and Gesa Münchhausen. 'Recognition and Validation of Prior Learning.' *Validierung von Lernergebnissen - Recognition and Validation of Prior Learning*. Ed. Sandra Bohlinger and Gesa Münchhausen. Bielefeld: Bertelsmann, 2011. 7–26. Print.

Böhmman, Marc, and Thomas Klaffke. 'Die Neuen Kommen! Gut Starten in Schule Und Kollegium. Supplement Zum Friedrich Jahresheft'. *Friedrich Jahresheft*. Seelze: Friedrich Verlag, 2010. Print.

*Bundesgesetz Über Die Organisation Der Pädagogischen Hochschulen Und Ihre Studien (Hochschulgesetz 2005 - HG)*. N.p. Web. 5 Feb. 2016.

Bundesministerium für Bildung und Frauen. 'Bundesministerium Für Bildung Und Frauen - Warum Brauchen Wir Eine Neue LehrerInnenausbildung?' *PädagogInnenbildung Neu*. N.p., 26 May 2014. Web. 1 Feb. 2016.

Cedefop. *European Guidelines for Validating Non-Formal and Informal Learning*. Luxembourg: Office for Official Publications of the European Communities, 2015. Web. 1 Feb. 2016. Cedefop Reference Series 104.

Cedefop. *European Guidelines for Validating Non-Formal and Informal Learning*. Luxembourg: Office for Official Publications of the European Communities, 2015. Web. 1 Feb. 2016. Cedefop Reference Series 104.

Cedefop, European Commission, and ICF. *European Inventory on Validation of Non-Formal and Informal Learning - 2016 Update. Synthesis Report*. Luxembourg: Publications Office, 2017. Print.

Dewey, John. *Experience and Education. The 60th Anniversary Edition*. West Lafayette, Indiana: Kappa Delta Pi, 1998. Print.

Dreyfus, Hubert L. *On the Internet*. Milton Park, Abingdon, Oxon; New York, NY: Routledge, 2009. Print.

Dreyfus, Stuart E., and Hubert L. Dreyfus. *A Five-Stage Model of the Mental Activities Involved in Directed Skill Acquisition*. Berkeley: Operations Research Center, University of California, 1980. *Google Scholar*. Web. 1 Feb. 2016.

Jackson, Robyn Renee. *Never Underestimate Your Teachers. Instructional Leadership for Excellence in Every Classroom*. Alexandria, Virginia: ASCD, 2013. Print.

Kohls, Christian, and Christian Köppe. 'Evaluating the Applicability of Alexander's Fundamental Properties to Non-Architecture Domains.' *PURPLSOC: Pursuit of Pattern Languages for Societal Change/PURPLSOC: The Workshop 2014 Pursuit of Pattern Languages for Societal Change*. Ed. Peter Baumgartner and Richard Sickinger. Krems: Department for Interactive Media and Educational Technologies, Danube University Krems, 2015. 188–210. Print.

Langer, Susanne K. *Philosophy in a New Key: Study in the Symbolism of Reason, Rite and Art*. 3rd ed. Harvard University Press, 1957. Print.

Latour, Bruno. *Reassembling the Social: An Introduction to Actor-Network-Theory*. New Ed. Oxford University Press, 2007. Print.

Le, Duc. 'Face Detection and Recognition on the App Store'. *App Store*. N.p., 9 Nov. 2015. Web. 1 Feb. 2016.

Markauskaite, Lina, and Peter Goodyear. 'Tapping into the Mental Resources of Teachers' Working Knowledge: Insights into the Generative Power of Intuitive Pedagogy'. *Learning, Culture and Social Interaction* 3.4 (2014): 237–251. *CrossRef*. Web.

Polanyi, Michael. *Personal Knowledge: Towards a Post-Critical Philosophy*. Corr. Ed. University of Chicago Pr., 1974. Print.

---. *The Tacit Dimension*. Reissue. University of Chicago Press, 2009. Print.

---. *The Tacit Dimension*. Garden City, New York: Doubleday & Company, Inc., 1966. Web. 26 Jan. 2016.

Quillien, Jenny. *Delight's Muse. On Christopher Alexander's The Nature of Order*. Iowa: Culicidae Architectural Press, 2008. Print.

Schmidt-Hertha, Bernhard. 'Formales, Non-Formales Und Informelles Lernen'. *Validierung von Lernergebnissen - Recognition and Validation of Prior Learning*. Ed. Sandra Bohlinger and Gesa Münchhausen. Bielefeld: Bertelsmann, 2011. 233–251. Print.

Smith, Larry, and Berwyn Clayton. 'Student Insights and Perspectives on the Validation of Learning Outcomes'. *Validierung von Lernergebnissen - Recognition and Validation of Prior Learning*. Ed. Sandra Bohlinger and Gesa Münchhausen. Bielefeld: Bertelsmann, 2011. 445–460. Print.

Talbot, Jon. 'A Case Study in the Development of a Work-Based Learning and the Possibility of Transfer to Continental European Universities. The WBIS Program at the University of Chester, England.' *Prior Learning Assessment Inside Out* 2.2 (2014): n. pag. Web. 1 Feb. 2016.

Tsui, Amy B. M. *Understanding Expertise in Teaching. Case Studies of ESL Teachers*. Cambridge: Cambridge University Press, 2003. *books.google.at*. Web. 1 Feb. 2016. Cambridge Applied Linguistics.

Widiker, Viktor. 'FlashFace Full on the App Store'. *App Store*. N.p., 11 Feb. 2012. Web. 1 Feb. 2016.