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Motivational and Affective Aspects in Technology Enhanced Learning (MATEL)

Proceedings of the MATEL Workshop 2013-2014

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Impressum

Foreword

The main purpose and focus of the MATEL workshop series on Motivational and Affective Aspects in Technology Enhanced Learning has been to stimulate interdisciplinary exchange and joint research activities on understanding and addressing motivational factors and emotions in learning solutions. There is hardly any opposition to the importance of these factors for the success of these solutions. However, there was always a major lack in systematic support and scientific rigor in the interdisciplinary field so that it was characterized through anecdotal evidence and hard-to-generalize results. In 2013 and 2014, *From Art to Engineering* has become the major motto of the MATEL workshop series. In this report, we bundle the 2013 and 2014 contributions that show steps on this journey.

Contents

MATEL Workshop Series:
International Workshop on Motivational and Affective Aspects of Technology Enhanced Learning (MATEL)

1 Introduction: Objectives and History

Motivational and affective aspects are frequently neglected in Technology Enhanced Learning although they are one of the most important factors when it comes to acceptance and success of TEL solutions. This becomes even more important as we move towards more open, independent, and informal learning settings. However, our understanding of these aspects and the implication this understanding would have on concrete solutions for learning is very fragmented:

Pedagogical models emphasize the importance of holistic perspectives on learning, but still (implicitly) consider these aspects as peripheral. Psychology has investigated this topic area in depth from a theoretical and experimental point of view, but often there is a gap between generic theories of motivation and emotions, and concrete implications for didactical settings, tool design, and organizational guidance. We also know little, e.g., about reflection on emotions and one's own motivation.

On the technology side, it is often unclear where and how to consider these aspects in the tool design as it requires a much wider perspective. Here, the affective computing strand has concentrated on tackling emotions, but so far has had little relationship to learning. CSCW research (particularly as part of the Web 2.0 hype) had a closer look at the influences on collaboration. The (serious) games approach to learning is mainly a response to the motivational success of gaming, but struggles with how to combine this effect with a didactical approach. In workplace settings, particularly in knowledge management, motivation has been recognized as key success factor to ensure that introduced instruments and tools are getting used. However, many approaches have concentrated only on incentives, both in terms of monetary rewards and other extrinsic motivation schemes which are designed mainly as top-down instruments – with mixed success.

We are convinced that we can meet these challenges only in an interdisciplinary way. Therefore we want to bring together in this workshop the different perspectives on the topic in order to foster the formation of a community between psychology, sociology, pedagogy, human resources, CSCW and computer science.

The MATEL workshop has a successful history with its first edition at EC-TEL 2010 and continued to provide an engaged forum for the subject area, which helped to form a community around the topic, set up a mailing list with more than 130 interested individuals and a website under http://matel.professional-learning.eu.

2 Workshop Concept

After identifying topics and research challenges to structure the field in 2010 and 2011, the main theme "from art to engineering" in 2012 and publishing the results of the first three editions at EC-TEL 2013, we wanted to develop the format further towards creating an structured experience base. The foundations for this experience base were participants' concrete examples, including both, prototypes and systems as well as experience reports from the introduction and usage of approaches, services and tools that address motivational and affective aspects in technology enhanced learning. Together with participants we took these contributions as starting point for further discussions and sharing of good and bad practice from different contexts. Similar to other engineering disciplines, we explored how patterns as aggregation and systematic descriptions of good practices can help to sustain and systematize these experiences for reuse. These socio-technical patterns comprise practices to inform both tool design as well as strategies for adoption.

Within a one day workshop, we complemented one session on full research papers, position statements and experience reports, with a second session on tool demonstrations where participants analysed and discussed the motivational and affective aspects of those tools. More or less in-depth evaluation results by the presenters were welcome, but not a prerequisite. The participants were given the opportunity for an intense moderated discussion, leading to first motivational socio-technical patterns as one of the outcomes from the collaborative sharing of experiences within the group. Where possible, we encouraged presenters of tools to provide access to the tools prior to the workshop to allow workshop participants to prepare themselves. As a concluding session of the workshop, we synthesized the discussion results and further developed research priorities from last year's edition of the workshop.

All this lead to a rough (and flexible) workshop schedule:

- Keynote presentation on patterns in similar fields
- Full papers with discussion slot
- Informal experience discussion
- Short scientific contributions and experience reports with discussion slot
- Tool demonstration and discussion
- Development of a pattern-based approach to addressing motivational and affective aspects in design for TEL
- Concluding discussion slot synthesizing the results

We had a wide range of participants from multiple disciplines, especially bridging technical and non-technical audiences, and multiple projects. In total, we expected around 15-20 participants based on previous experiences. The workshop proceedings would be published in an open access proceedings volume.

3 Topics

3.1 Topics for Position Statements and Scientific Contributions

Topics encompass the following:

- **Experience reports** and lessons learnt from introduction/usage of tools related to learning or knowledge development/engineering (success and failures), e.g.,
    - Knowledge management and workplace learning
    - Semantic technologies
    - CSCL, CSCW and Web 2.0
    - Enterprise 2.0
    - Serious games
    - MOOCs in educational and workplace learning contexts
    - E-Coaching and other areas of technology-enhanced consultation

- **Pattern-based capturing of design knowledge** of soft factors, particularly related to motivation and affective factors, but also in adjacent areas

- **Design methodologies** for incorporating motivational and affective factors
    - Experiences with participatory design
    - Engineering socio-technical systems
    - Experiences with concrete research instruments
    - Indicators for evaluation

- **Approaches, services, or tools** to address motivational and affective aspects
    - Feedback mechanisms
    - Organizational incentives
    - Detecting affective states via sensors
    - Exploiting curiosity
    - Life logging and Quantified Self inspired approaches
    - Learning about emotions (e.g., coping strategies) through reflection and resource activation
    - Gamification and playful design

- **Organizational aspects**
    - Role of context (social, cultural) on motivation to learn or share knowledge
    - Role of affective aspects for daily work routines

- **Models** for understanding motivational and affective aspects/emotions from disciplines like pedagogy, psychology, human resources management and economics, sociology, usability engineering (e.g., joy of use driven approaches), or computer science (e.g., context ontologies for affective and motivational factors)

3.2   Topics for Tool Demos and Discussions

We invite developers and researchers of tools and systems in the area of Technology Enhanced Learning to present them under the perspective of motivational and affective aspects, such as:

- Tools for supporting individual or team reflection and coaching
- Quantified Self approaches and use of sensors
- Mobile learning support apps, e.g., for e-coaching, e-learning
- Personal Learning Environments
- Tools for informal learning and knowledge management in organizations
- Innovative enterprise social media approaches
- Serious games

4th International Workshop on Motivational and Affective Aspects in Technology Enhanced Learning

September 17-18, 2013
Paphos, Cyprus

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Toward Personalised Gamification for Learning Environments

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Abstract. Many learning environments are deserted by the learners, even if they are effective. Gamification is a growing approach used to raise learners' motivation by adding game elements in their environment, but it still pays little attention to the individual differences among learners' motivations. This paper presents a gamification system designed to be plugged on various learning environments. It can be automatically personalised, based on an analysis of the interaction traces.

Keywords: gamification, learning environment, personalisation.

1   Introduction

Many learning environments have been shown to be effective when used, but are quickly deserted by learners. This paper aims to propose a way to raise motivation in learning contexts that are not intrinsically motivating, by using a gamification system. The difficulty comes from the fact that people do not have the same expectations about games, and do not have the same emotional responses to a given stimulus. That is why we aim at developing a motivational system that can be automatically personalised.

2   State of the Art: User Models in Game Based Learning

2.1   Gamification or Serious Game

Two approaches are used to add fun in game based learning activities: learning games, and more recently gamification. Learning games refers to the use of digital games for learning purposes [1]. Gamification is "the use of game design elements in non-gaming contexts" [2]. These two approaches are often poorly distinguished one from the other. However, they differ by their design process and by the resulting application (Table 1). In this work, we focus on gamification because, firstly, it can be based on existing environments. Secondly with gamification, the game elements seem not to be central but

peripheral, which fosters a generic implementation of the game. This view is a first step toward a "fun layer" that could be plugged on several applications.

	Learning game	Gamified application
Design process	The application is designed like a game from the beginning	Gaming elements are added to an existing application.
Resulting application	A game which offers activities for the user to acquire knowledge and skills.	A learning application enriched by game mechanics to motivate the learner.

Table 1. Differences between a learning game and a gamified application.

2.2   A User Model for a Gamified System

Some attention is paid to basic data about users, like their age and gender, as it as an influence on their levels of attention and motivation [3] [4]. Researches on learner models focus on the relation between the learner and the knowledge. For example, Conati et al. [5] built a user model to assess the learner's self-explanations. In the game-based learning field, many studies have been conducted about the way people play games. Bartle [6] identified four player types: killer, achiever, socialiser, and explorer. Yee [7] identified three main motivation components: achievement, social and immersion. Lazzaro [8] observed four motivational factors for playing games: hard fun, easy fun, altered state and people factor. The user model we propose in part 3 is based on these three types of user data (basic data, learner model, and the way people play).

Kobsa et al. [9] suggest distinguishing three forms of adaptation: to user data, to usage data and to environment data. All these parameter types have to be taken into account to personalise the game elements of an environment. Whether they focus on learning features or playing features, usage data should be based on the users' traces of interactions with the environment. Bouvier et al. [10] define a typology of engaged behaviours, to determine if a player is engaged or not. Finally, some research help to understand the influence of environment data, which we can call context. For example, Cheng [11] tried to find the good moments to play at work.

3   Architecture for a Personalised Gamification

In order to personalise the fun features of the system, we need it to be able to work with or without these features. That is why we propose to use epiphytic functionalities: applications that are plugged in another application without being necessary. Giroux et al. [12] describe epiphyte systems as follow: (1) the epiphytic system cannot exist without a host, (2) the host can exist without the epiphyte, (3) the host and the epiphyte have independent existences, and (4) the epiphyte does not affect its host.

By implementing the fun functionalities that way, we can enable or disable them independently for the users, in order to personalise their interface without affecting the learning application. We provide below 3 examples of such functionalities to be activated in some cases:

- A leader board of fast learners for competitive users.
- Badges and cups for achievers.
- A chat feature for users interested in socializing.

An overview of the proposed architecture is presented in Figure 1, which shows the way the gamification system can be plugged in an existing learning environment. Epiphyte functionalities can be part of the existing learning environment, or can be brought with the gamification system. The first option fosters the creation of specific functionalities well integrated in the user activity. The advantage of the second option is the use of generic functionalities, usable by different learning environments. Both types of functionalities can be managed by a gamification engine. The role of this engine is to decide when and how to able or unable the functionalities, based on (1) the static information of the user model, (2) the dynamic information of the user model, and (3) contextual information.

1. The static part of the user model only contains the features "age", "gender", and some administrative information if necessary.
2. The dynamic part of the user model is divided into two parts: the learner model and the player model. We assume that the learner part is handled by the existing environment core that manages the learning activity. The gamification system focuses on the player part. It identifies the player's preferences, to manage motivation by gaming. These features are calculated from the interaction traces with the epiphytic functionalities. As some functionalities do not require interactions, the engine has to find a correlation between the engagement of the learner and the activation of the functionalities, to measure their effectiveness. Thus the level of engagement has to be calculated and communicated to the gamification engine.
3. In addition, some contextual information are crucial for the gamification engine. Firstly, is the learner at school, at work, or on free time? If the learners are all in the same room with a teacher to help them, a chat feature could be useless. We also can look at the device used, as some features are more relevant on mobile devices, and others on computers.
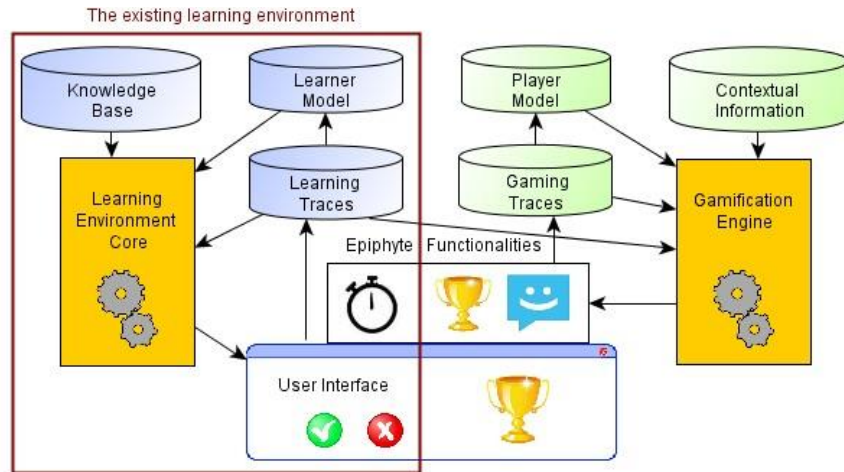
Figure 1. Architecture of the gamification system, plugged on the learning environment

The Gamification Process is divided into three steps:

1. The interaction traces are permanently collected, and the player model is regularly updated, based on these traces. At the same time, a regular analysis of the user engagement is performed.
2. When the learner seems to be disengaging, the gamification engine starts working and selects an appropriate epiphytic functionality.
3. The selected functionality is introduced and integrated in the user activity.

4   Conclusion

In this article, we propose a system architecture to motivate learners by integrating game elements in existing learning environments. We do not aim to turn every learning activity into a game, because games need to be played voluntary and people in some contexts are already motivated to learn. This system should be used with non-intrinsically motivating activities, like memorizing vocabulary or mathematical rules.

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Exploring Motivational Aspects for Technology-Enhanced Informal Learning in the Construction Sector

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Abstract. Introducing technology support into informal learning at the workplace in the construction sector requires investigation into the motivation structures of the involved stakeholders. In this contribution, we present the results of an exploratory, qualitative interview study. It shows the current state and differentiated attitudes towards technology and its use in work processes. It also points towards areas that need further investigation.

Keywords: motivation, informal learning

1   Introduction

Motivation has been recognized to be a key factor for any technology-enhanced learning solution [1], but it has also been found that motivation to learn, to share knowledge or to adopt a certain technology solution is a complex issue that requires deep contextual investigations.

As part of the LAYERS project [2], we have been exploring the potential of supporting informal learning in the construction sector. As in other job areas, informal learning constitutes the majority of learning activities, but its support faces several peculiarities compared to other professions that have been so far in the focus of TEL solutions: work practice is less computer-based, and the physical environment dominates and puts restrictions on usage of learning tools. To explore the potential novel technology-enhanced learning approaches and to understand the conditions for their successful adoption, an exploratory study has been conducted to better understand motivational structures, design and acceptance factors for solutions, and possible ways of appropriation.

2   Method

Given the complexity of the context with various trades and stakeholders, an interview-based was chosen. In total, 8 interviews were conducted with craftsmen in various positions in the southwest of Germany. They covered various trades/professions, such as a carpenter, a systems mechanic, an electrician ("Meister"), a medical technology elec-

trician ("Meister"), an all-rounder specialized in refurbishing older houses (self-employed), a bathroom specialist, a kitchen specialist, and a construction engineer. The interviews took between 22 and 57 minutes.

The interviews were transcribed and analysis using Qualitative Content Analysis techniques from Mayring [3].

3   Results

In the following sections, we summarize the results from analysing the interview transcripts. The discussion is structured along (i) structure of communication channels, (ii) current state of using technology at the workplace,

3.1   Use of Technologies

The results of the use of mobile technology was mixed; the majority (6 out of 8) regularly use a smartphone, primarily for taking pictures at the construction site, for accessing emails and calendar and messaging (text messages via operator or replacement services such as WhatsApp). In the sample, most services used were free services. Internet search is usually not used on site, rather by foremen, owners of the company, or similar at their desks. Videos on YouTube are not considered useful as not reliable.

Problems with smartphones in particularly are lack of connectivity, particularly in buildings and in rural areas. Some features of smartphones are not used and instead a separate device is carried along (e.g., a voice recorder) because they have not found out how to use it.

As barriers to introducing new technology, purchasing costs, but also training costs were mentioned. But there were also concerns about introducing dependability on technology, which is not seen as really reliable.

3.2   Usage of Forums

One particular area that was explored within the interviews was the usage of forums and the experiences with it. These were not very positively perceived by the interviewees:

- **Time.** Search in forums was found to be time-consuming. There is no guarantee to receive a response to inquiry, and the time to get a response is usually not within a short time frame.
- **Quality**. A big challenge for using informal exchange forums in the construction domain is how to judge the quality and reliability of the contributions. Sometimes products or companies badmouthed without a reason so that there is general mistrust towards the information found in forum. This is at the heart of informal learning where natural authority does not exist.

3.3 Competition

The construction sector is characterized by a large number of small and medium sized companies where learning particularly has to be considered also in a cross-organizational perspective. Therefore, within the interviews, also issues of competition have been analysed. While competition is an issue, the importance as a barrier has been very mixed. Some do not see competition as a major issue and view as a give-and-take situation and rather see quality issues with other companies. Others expressed competition to be critical, particularly within the electrician trade.

In general, the closer companies are, the more difficult knowledge exchange might become. Closeness can be geographical, but also same trade or adjacent trade. More investigation will be needed to extract the factors that influence the competition situation.

3.4 Heterogeneous Hierarchies

One important result of the analysis was the heterogeneity of the communication relationships and associated motivational structures.

	Communication channel	Current practice
A	Craftsman – Craftsman	Predominantly face-to-face communication Degree of discussion between peers (esp. across companies) depends on trust
B	Craftsman – Foreman	face-to-face (if on-site), otherwise mobile phone Craftsmen are often expected to check with their superior in case of doubt, or lack the willingness to take over responsibility
C	Craftsman – Owner	Mobile phone Craftsmen are often expected to check with their superior in case of doubt, or lack the willingness to take over responsibility
D	Owner – Owner	Mobile phone or email depends a lot on trust, competition situation (or its perception) varies across different trades (and maybe regions)
E	Owner – Architect/ Site manager	Mobile phone or email
F	Foreman – Architect/ Site manager	Mobile phone, email, face-to-face
G	Craftsman – Architect/ Site manager	In general difficult and very little However, it can be an important source of learning for site managers that get along well with craftsmen

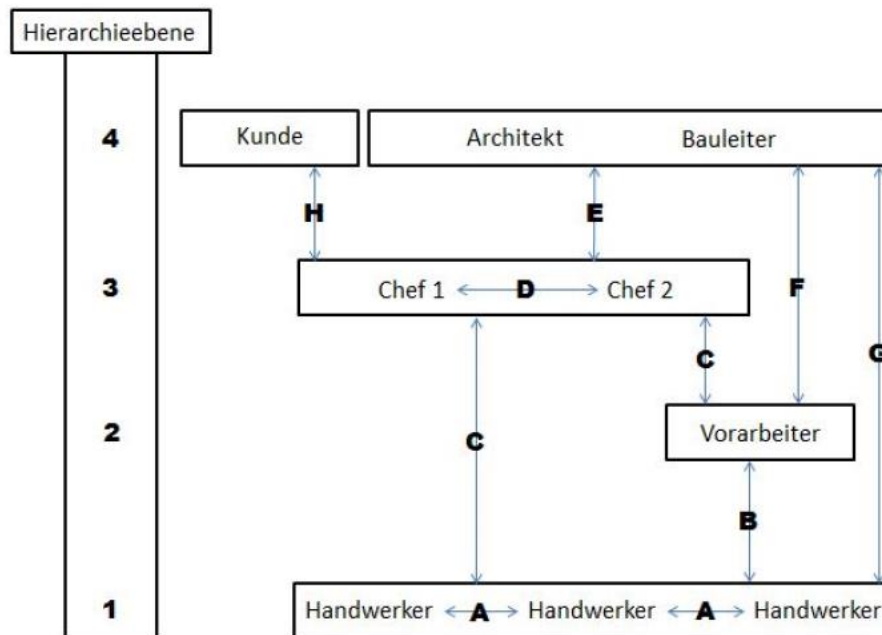| H | Owner – Customer | Initially face-to-face, later also email and phone |
| | | Constant contact makes it easier to develop a solution |

Figure 1: Hierarchical communication structures

3.5   Attitude towards Technology Support

With respect to technology support, at first sight the results have been as expected. The younger generation is very inclined to use technology (and usually owns a Smartphone and uses it regularly, also at the workplace), but older generation not so familiar with and are rather reluctant to use it. A closer investigation, however, has shown that apart from familiarity, there is also a deeper issue that is related to expected usefulness.

More experienced craftsmen evaluate the potential usefulness of technology by observing the use by the younger generation. They find that this often do not contribute to increasing productivity or similar, which does not lie in the technology itself, but in its appropriation. Increased and better communication possibilities are outweighed by lack of commitment in communication, and by disturbing productive communication on-site, potential for ubiquitous access to information are outweighed by distractive use of it, and by lack of preparation. One example is the interviewee who deliberately does not own a mobile phone, and who forces the other craftsmen at the construction site that they put their mobile phone into a box in separate room during on-site meetings. He feels committed to delivering the best value in the time charged to the customer, and he views is critical to come unprepared in terms of tools to a site.

Even the most technology-critical interviewees, whoever, do make use of the possibilities of the Internet. The higher in the hierarchy, the more they research on various aspects. Here trust in the information found is an issue, but it seems that experience can help in making an informed decision about the value and credibility of the information. Actively contributing to forums, e.g., was not very common. One obvious issue is time; the other issue is related to data privacy (having to sign in with personal details).

3.6   Summary

Throughout the interviews, the following main factors could be identified. On the positive side, promoting motivation to adopt technology solutions for supporting informal learning at the workplace were (rather immediate) benefits for saving time for carrying out tasks. Also helping others is mostly viewed positively, particularly where their expertise is honoured as "expert knowledge", however, the prerequisite was expected reciprocity. An interesting factor for technology adoption is that private benefits resulting from business use are seen as very positive, e.g., being able to use a smartphone or tablet not only at the workplace. While this creates issues of data protection, this observation could also help to overcome the pressure of immediate benefit, which is hard to realize.

As informal learning heavily depends on empower learners that take responsibility for their own learning, some challenging aspects could be identified. One aspect relates to the overall communication culture in the construction sector. Hierarchies and the predominantly hierarchical organization of communication hinders efficient knowledge exchange, particularly at SMEs which most often do not have any institutionalised ways of knowledge development. Here liability and competition are to be explored further. The second aspect relates to a general observation of decreasing willingness to take over responsibility in the younger generation. Most experienced interviewees complained about this, which leads to a reinforcement of the hierarchical communication patterns and decreases also chances for informal learning at the lower levels.

Finally, introducing technology without consciously and reasonably changing work processes, communication behaviour and personal routines will most likely not deliver any benefit. This also seems to be a barrier for the more experienced craftsmen to embrace new technologies as they do not see how the technology could solve the problems at the workplace, based on their observation how the more technology-savvy younger generation makes use of technology.

4   Conclusions and Outlook

The interviews have yielded a rich picture of the way of thinking in the construction sector. While the study is clearly limited by its sample size, it still has uncovered important aspects for further exploration.

Any technology-enhanced learning solution needs to be a package of devices, software solutions, and appropriation patterns. Especially the latter two need to be part of a co-evolution process in which the users themselves and the solution providers are part

of a learning process that changes work process and personal habits on the one side, and design elements on the other side.

Clear value, time-saving, and trust in sources were the main adoption criteria that interviewees expressed. Particularly the latter is a key research challenge that will be further addressed in the LAYERS project: how can we foster (appropriate) trust both as part of the interaction with other people and the interaction with digital material.

Currently, the interview results are being condensed into narratives which can then be used to transport the rich understanding to the other members of the project who have not been involved in the interviews and do not have direct contact with users. While direct contact is always preferable, the constraints do not always for allow sufficient interaction possibilities so that narratives are a promising compromise.

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A Short Introduction on Patterns

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1 Introduction

The work with pattern languages began in the field of building architecture, when Christopher Alexander had the idea of capturing design guidelines in the form of design patterns and published two books: A Pattern Language [1] and The Timeless Way of Building [2].

In Alexander's own words, a pattern „describes a problem which occurs over and over again in our environment, and then describes the core of the solution to that problem, in such a way that you can use this solution a million times over, without ever doing it the same way twice" [1, p. 10].

A pattern has always the same format, which has two objectives: The first objective is to make understandable for the reader that patterns are connected with each other and form a language, which allows for "an infinite variety of combinations" [1, p. xi]. The second objective is that problem and solutions of the patterns are presented in a way that the individual reader can individually judge and adapt it for him/herself without losing "the essence that is central to it" (ibid).

A pattern language is a network of patterns that call upon one another. It is a generic language, which is dynamic and interacts with the context. It allows people to start with the existing context and combine different patterns to create solutions, which relate to this context [3].

Alexander ordered and numbered his patterns sequentially. He started with the most general ones (in the case of his architectural patterns these were patterns for regions and towns), going down to the most specific ones (in his case patterns for buildings, rooms, ending with details of constructions). Patterns are linked conceptually and actually with each other. Each pattern is connected to "larger patterns" which it belongs to and consists of a certain number of smaller patterns, which come below. In Alexander's words: "Each pattern can exist in the world, only to the extent that is supported by other patterns: the larger patterns by which it is embedded, the patterns of the same size which surround it, and the smaller pattern which are embedded in it" [1, p. 13].

Patterns are identified or mined (pattern mining) after numerous implementations of the same solution in a given problem, usually by different people. A pattern tries to describe the essence of a solution, which is derived from a number of different good practice examples. This kind of abstraction of best practice examples, allows transferring to solution to other contexts. Using on of Alexander's patterns, I would like to exemplify this abstraction level:

Pattern number 112 "Entrance transition". The design problem of this pattern was described as: "Buildings, and especially houses, with a graceful transition between the street and the inside, are more tranquil than those which open directly off the street."

The design solution was described as: "Make a transition space between the street and the front door. Bring the path which connects street and entrance through this transition space, and mark it with a change of light, of sound, of direction, a change of surface, of level, perhaps by gateways which make a change of enclosure, and above all with a change of view." Pictures then show good practice examples, which illustrate implementation examples of the proposed design solution.

Having this abstracted design solution, each designer can adapt it to the specific context he is confronted with, without losing the essence, which is the transition from private to public space.

Bauer and Baumgartner [4] provide a description on how patterns are discovered, suggesting that pattern designers start with the analysis of a solution. As patterns help to solve recurrent problems in a specific context, one can only talk from a pattern when there are two independent application scenarios of a certain solution or at least three good practice examples, which describe the solution of a specific problem. Having analysed solutions to recurrent problems, the pattern author starts describing the problem and the system of forces that operate in the specific context and need to be brought into balance to solve the problem. In this analysis the pattern designer extracts the tacit knowledge, which helps experts to take the right decision, and makes it explicit and thus applicable by other persons.

It is "a process of reverse-engineering the systems that embed good design in order to make that design explicit, and be able to communicate it to other designers, so that it becomes common practice" [5, p. 16].

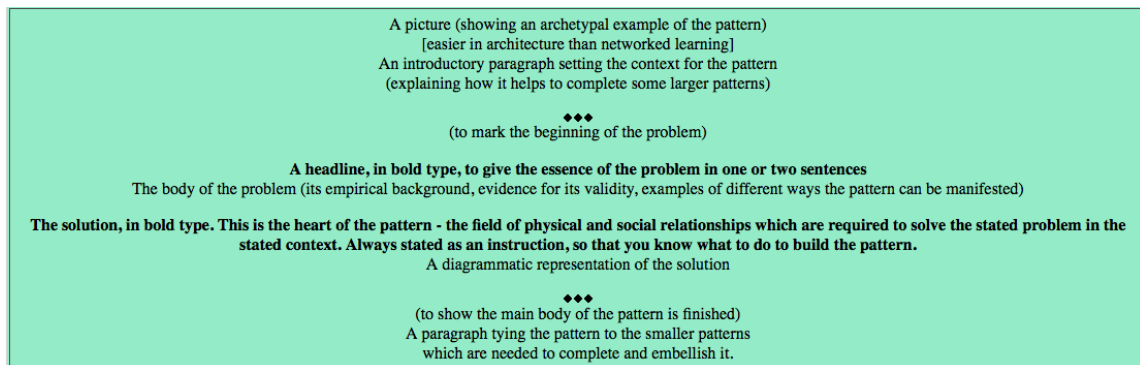The typical format of a pattern is shown in the following figure:

A picture (showing an archetypal example of the pattern)
[easier in architecture than networked learning]
An introductory paragraph setting the context for the pattern
(explaining how it helps to complete some larger patterns)

◆◆◆
(to mark the beginning of the problem)

A headline, in bold type, to give the essence of the problem in one or two sentences
The body of the problem (its empirical background, evidence for its validity, examples of different ways the pattern can be manifested)

The solution, in bold type. This is the heart of the pattern - the field of physical and social relationships which are required to solve the stated problem in the stated context. Always stated as an instruction, so that you know what to do to build the pattern.
A diagrammatic representation of the solution

◆◆◆
(to show the main body of the pattern is finished)
A paragraph tying the pattern to the smaller patterns
which are needed to complete and embellish it.

Figure 2: A typical pattern format [6]

Patterns are alive and evolving. They are dynamic and ideally amended and improved by the community of experts working in the field, which the pattern language tries to describe. "The patterns are the basic vocabulary of a pattern language, which is continually refined and enhanced" [4, p. 17, translated from German].

Alexander's idea behind the pattern language was not only to identify and describe some physical structures, which would make the environment positive for human beings living in it. He wanted to do it in a way, which would allow this to happen on a really large scale, in a way that this would be in everybody's hand.

Therefore the pattern language that he began creating in the 1970s had three essential features. "First, it has a moral component. Second, it has the aim of creating coherence {…}. And third, it is generative" [2, p. 74].

For Alexander patterns are not only representations of some detached ideas about how to solve problems in a certain domain. Patterns, taken as a system, have in addition a moral implication and the aim to generate coherence. Taking the moral component, it deals with the question "under which circumstances something is good?" In the case of the architectural patterns the question is "under which circumstances the environment is good?" In the case of software patterns the question should be under which circumstances the program that is created has the capacity to make human life better, instead on focusing on technical efficiency only. The coherence component requires the pattern designers to ask themselves if the whole system of patterns creates coherence, thus going beyond the presentation of fragmentary ideas and solutions. In his keynote at the 1996 ACM Conference on Object-Oriented Programs, Systems, Languages, and Applications (OOPSLA), Alexander criticised the software-engineering pattern community of neglecting these two factors of pattern languages.

In his keynote Alexander also referred to the fifteen properties. "These 15 properties seemed to define a more fundamental kind of stuff; similar to the patterns we had defined earlier, but more condensed, more essential – some kind of stuff that all good patterns were made of." [2, p. 76]. He started to investigate these properties when he realized that the buildings, which were generated using his and his colleagues' patterns, were "not profound" and "something fundamental seemed to be missing from the pattern language."

The 15 properties are geometric properties that form the basis of particular individual patterns and appear whenever buildings had more living structure. "Living structures are the result of a structure preserving process of becoming." [7, p. 4].

"Life arises from a system of constituents that contribute to a shared identity and purpose, a concept Alexander names wholeness where each part's structure and function flows into a continuity of the whole" [7, p. 8]. Under building that having more living structure Alexander refers to structures that consider human feelings, where people feel „more whole", „more alive" in the presence of these things [2, p. 76].

The 15 properties not only help to describe the structure of things that are well-designed but also to define the process that leads to a good structure. Alexander admitted that he was not sure if these 15 geometric structures could be transferred to other domains like software-engineering, but stressed the importance of these properties as fundamental basis of his pattern language.

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MATEL 2013: From Art to Engineering with Motivational Design Patterns

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The 2013 edition of the workshop has concentrated on identifying the key elements that would help the community around motivational and affective aspects to advance from "art to engineering". This has led to a map of future research activities with centre around motivational design patterns:

- Design process patterns, capturing experiences how to incorporate these aspects into the design process
- Feature patterns, describing technical features and how they contribute to motivation & emotions
- Measurement patterns, describing how to measure and assess interventions
- Roll-out patterns, describing how to best introduce new solutions with respect to motivation and emotions

The discussion had a particular focus on the measurement aspect and identified multiple purposes:
- Diagnosis and analysis, i.e., finding out about problems that need to be addressed
- Effect assessment, i.e., judging how the intervention has changed the situation
- Scientific rigor, i.e., for producing scientifically valid results

This has yielded a route for further study.

5th International Workshop on Motivational and Affective Aspects in Technology Enhanced Learning

September 16, 2014
Graz, Austria

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Reflections on the acceptance and success of RadioActive101: Motivation through problematisation, improved well-being, emancipation and extreme learning

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Abstract. One way to tackle the often neglected and also 'slippery' and complex concept of motivation in Technology Enhanced Learning (TEL) is to reflect on what motivational and affective factors led, or may have led, to the acceptance and success of a TEL innovation. This article does this, through presenting the implementation and evaluation of a 'radical' TEL intervention, called RadioActive101, an active international internet radio hub that is an educational intervention which promotes inclusion and informal learning through giving a voice to disenfranchised groups in mostly urban areas throughout Europe, with a particular focus on at-risk and unemployed young people. This paper will: contextualize RadioActive101 from a motivation perspective; describe this project along with its strikingly positive evaluation so far; and, reflect on the motivational and affective factors that are implicated. These motivational factors and forces, as our title indicates, are linked to our design approach (the problematisation), improvements in confidence and well-being, the perceived and actual value of the learning (as emancipation) and the motivation bought about through 'extreme' learning.

1 Motivation, TEL and 21C Learning

Motivational and affective factors are becoming increasingly important in Technology Enhanced Learning (TEL) as the field shifts to focus increasingly on more open, independent and informal learning approaches [1]. Arguably, these approaches are more relevant processes to becoming an active citizen or working in the 'Digital Age' where

the appropriateness of pre-structured, pre-defined and 'staged' curricula seem often unsuitable and out of date. This is also linked to how the TEL Community has emphasised the need to focus on 21C skills (e.g. The Proceedings of EC-TEL 2012, [1]), which is also similar to the idea of 'Fusion Skills' [2], to meet the changing needs of what is required to become educated and work in the digital age. These skills prioritize, in addition to traditional ones, competencies such as communication, digital media literacy, social skills and awareness, initiative and entrepreneurship, and cultural awareness, which are also part of the EU Key Competencies for Lifelong Learning[1]. However, a missing link in how this learning occurs and how these competencies are acquired is the motivational and affective factors that, in certain ways, are the 'engine' that drives the learning process. But how do we establish the key motivational and affective factors that are at play and complicit in realising 21C learning? Can we design for motivation? Or does motivation come from a complex interplay of relations between emotions, values, personal situations and complex reward relations between the learner and their environment? Arguably, instead of theorising about motivation, or trying to design for it, a more pragmatic approach is to perform a reflective analysis of accepted and successful TEL innovations, from a motivational perspective. The rest of this paper does this, through treating RadioActive as a nuanced Case Study we: describe a 'radical' TEL innovation (RadioActive101); describe its successful adoption and evaluation; and, then reflect on the motivational and affective factors that led, or may have led, to its acceptance and success.

2 The RadioActive Model: Linking Inclusion, Informal Learning and Employability

The 'RadioActive101 model' is ambitious and relatively wide-ranging as it combines inclusion, informal learning and employability through creatively articulating the processes, practices and technologies associated with the 'whole space' of radio. Key to this is that the operations of this space are catalysed through the need to produce a quality broadcast according to a pre-defined timetable. Or, putting this in a more everyday vernacular, the 'buzz' of creating and broadcasting radio shows creates an engaging and motivating framework to develop and marshal the requisite digital media, communicative and organisational skills and practices that are implicit in radio production and broadcasting.

Central to the whole approach is the notion of 'learning by doing' that is theoretically informed through a synthesis of emancipatory learning through 'lived experience' that was proposed by Paulo Friere [3], Vygotsky's [4] notion of scaffolding and learning within zones of proximal development, socio-technical design [5] and learning through

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[1] These are: communication in the mother tongue, communication in foreign languages, mathematical competence and basic competences in science and technology, digital competence, learning to learn, social and civic competences, sense of initiative and entrepreneurship, cultural awareness and expression

dialogic and dialectic dialogue [6]. A simple way to conceive of the way these are articulated, is to think of the 'whole space' of radio production and implementation being a nuanced 'learning lab', that articulates these theoretical underpinnings in terms of the learning achieved through practically producing radio, and 'accrediting'[2] the processes in terms of the EU key competencies for Lifelong Learning that are recognised through a system of electronic badges. The way in which 'the badges process' in particular aims to motivate learning is given below. These are a relatively recent development within the project that is currently being implemented, but has not yet been evaluated. However, their rationale and design are particularly important from a learning and motivation perspective.

RadioActive101 has designed a set of 39 Mozilla Open Badges (see http://radioactive101.eu/podcasts/radioactiveproject/ActivitiesForBadges_en.html) that are being awarded. These cover technical, journalistic and organisational competencies. Each of these badges is linked to several observable real-life activities that must be completed to earn the respective badge. Activities are evaluated by learning facilitators and experienced senior education practitioners at each site. Also, the whole Badge process, from negotiation to awarding is deliberately open and encourages motivational dialogues between radio-activists, facilitators and senior practitioners. Badges come in Bronze, Silver and Gold to motivate the learner to achieve higher levels. Additionally, the possibility to easily publish Open Badges to Facebook and Twitter has a motivating effect for the many learners which are active in these networks. The modular, specific and profession-oriented character of the RadioActive101 badge system is designed for bottom-up usage in informal learning contexts where the learner decides which badges they are motivated to strive for.

The practical processes that are involved in the RadioActive model which lead to the badge acquisition are: recruiting and engaging participants who see how RadioAvtive101 is relevant to their lives; negotiating the roles that the radio-activists play, from the range of radio production and broadcast roles; training and scaffolding in radio production; 'learning by doing' of radio production that is facilitated and orchestrated through scaffolding; the planning and creation of show content and related promotional materials; broadcasting of live shows that are then archived; and, reflective and critical debriefs on shows linked to planning the next show.

Linking RadioActive101 badges to EU Key Competencies for Lifelong Learning or to the ESCO European Skills Competences, Qualifications and Occupations Framework (https://ec.europa.eu/esco/home) points the learner to the broader context and opens up further perspectives for lifelong learning.

All the above is concisely captured by our project slogan, which states:

"RadioActive101: Learning through radio, learning for life!"

Summarising, the RadioActive Model links attested notions of learning and informal learning to real-life situations covered by RadioActive101 programming. These are articulated through the development and application of digital media literacies and 21C

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[2]   We accept that the notion of 'accrediting' informal learning is a contentious issue, but we use the term deliberately loosely here as a description of a procedure in the learning process, and not as reference to formal accreditation procedures.

skills, which are in turn accredited in ways that are relevant to gaining employment or further education.

3 RadioActive101? Its Implementation and Evaluation

Actively developing, implementing and running the national RadioActive 'stations' (or hubs). We use the word 'station' circumspectly to describe our national internet radio initiatives, as the traditional concept of a radio station is deliberately questioned by RadioActive's radical approach to educational intervention. Its low-cost, extensibility and sustainability, are key factors in the success of the project. It is realised through the application of state-of-the-art thinking in Community Action Research, Socio-technical design (e.g. [4]) and Technology Enhanced Learning (TEL), and is described in detail in Ravenscroft et al. [7].

The implementation thus far is realised through five national hubs (web-sites) and one international hub (web-site) that provides access to the national ones (see radioactive101.eu). Over three hundred and fifty radio-activists have participated thus far, with many of these being constantly involved since their first broadcasts (so over eighteen months in some cases). Five excluded and disenfranchised groups have been participating so far – young people linked to youth organisations, older people (typically over 50 years old), school children from schools with high drop-out rates, HE students linked to church outreach organisations, and Learning Disabled young people. These radio-activists have engaged in 1,321 hours of preparation and broadcasting, which has led to 27,178 page views and 17,0355 unique web-hits/listeners.

The following section briefly presents the key evaluation findings so far, that are later reflected upon from a motivational perspective.

An early evaluation of RadioActive101 [8], showed its impact during a pilot phase in the UK, that was a four month intervention within a youth organization, that was striking. During this time: the number of new young people attending the centre increased from 5 - 28 (approx. 560% increase[3]); more at-risk young people were retained, increasing from 2 - 10 (approx. 500% increase); and, perhaps most striking was that the number of young people moving from 'NEET (Not in Education, Employment or Training) to EET (in Education, Employment and Training), increased from 3 - 24 (approx. 800% increase). The trend of these improvements also 'accelerated' during the later months as pre-recorded and live shows were broadcast. Although these numbers are relatively small, they are highly significant within a challenging youth work context, and clearly demonstrate the positive social impact of RadioActive101 at one site. Of course, these figures do not represent the outcomes of a well-defined empirical study, that was not possible at this early stage of the project, but both the Director of the youth organization and the youth worker who was centrally involved stated that these improvements were due to 'the radio project' and not to other activities within the youth centre. These early findings inspired the ongoing work in the UK (funded by the Nominet Trust) that led to the European version of the project (funded by the EC LLP). The

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[3] We are aware that the numbers given are relatively small, so the percentages given are considered strongly indicative rather than exact measures.

later evaluation of RadioActive Europe is described below, with a focus on disenfranchised young people in the UK and Portugal.

A second evaluation of RadioActive101, working with disenfranchised young people in two countries, the UK and Portugal, have shown strikingly positive and complementary findings. A study in the UK [9], was conducted first, as a 'prototype' evaluation for the other international partners. It had a representative sample (n=48) of learners (or radio-activists as we call them) and showed the delivery of additional impact and value beyond the informal learning of technical and employability skills. Additionally they found improvements in confidence, self-esteem and general well-being of individuals, groups and organizations involved with the project. Indeed the necessity of, and model for, developing a 'platform' of improved 'well-being' prior to and alongside the informal learning of digital literacy and employability skills was a key preliminary finding of the project. It appears that once our excluded groups developed the confidence and competence to perform activities they previously thought were beyond them, such as the production and broadcasting of live radio content, they seem then empowered, to learn many other things and to develop a number of key competencies[4]. In the UK evaluation, confidence levels were assessed by questionnaires which identified that on average (across different groups) over 50% of respondents felt they were more confident after being involved with RadioActive. The data across a range of mixed methods highlighted the significant impact the project had on the skills and social outcomes for these young people as well as on their well-being. For example the scores on the Rosenberg Self-Esteem Scale identified that all respondents scored in the normal or above normal range except two. The evaluation also highlighted the skills acquisition that participating in the project had brought about.

The evaluation conducted by partners in Porto (Portugal) was a pilot that used the same methodology as the UK as they were working with the same demographic, so their sample size was smaller (n=12). For the purposes of this paper we will present a synthesis of findings from both studies and then consider the implications.

Firstly, as mentioned earlier in the context of the UK groups, both groups noted the importance of developing greater 'confidence' and 'well-being' within their radio-activists, and that this was a platform for further engagement and skills development. In other words, RadioActive seems not just to be an educational intervention, but there are signs that it is also a positive psychological intervention (in terms of confidence, well-being, dialogue and digital discourse). Secondly, the groups noted wider positive impact than was initially envisaged. Whilst improvements in the informal learning of 21C skills leading to potentially greater employability was expected, the deeper psychological improvements within individuals and groups alongside broader organizational and social improvements and developments were not initially envisaged to the degree to which they occurred. These two national groups reported developments in improved communication and literacy skills linked to a greater confidence and propensity to use their voices, with this in turn, leading to more competent, confident and coherent group

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[4] Note, this is not apparently selection bias amongst those participating in RadioActive, as youth workers have noted that deciding to participate in other activities does not lead to the same level of improvements in well-being.

and organizational thinking and communication. Then, building on these improved communicative, digital and media literacy competencies the youth organizations in particular seemed to, as a 'unit', become better organized and drew greater attention to their activities. Thirdly, the groups noted that RadioActive was also a social and/or cultural, intervention, in the sense that it produces positive changes and impact at broader social and cultural levels beyond the organizations in which it is used, e.g. putting organizations on the cultural map, attracting attention and involvement from external agencies, and increasing very pragmatic dimensions – such as the capacity to attract further funding (that has happened in the UK). Fourthly, in achieving and realizing the above, the radio-activist groups felt a clear sense of 'ownership' of their shows, and that they are the central part of, and not 'performing for' RadioActive101.

A difference noted between these groups, was that the Portuguese young people underlined the benefits of exploiting family structure more, and related to this, engaging an audience that is perceived as a sort of 'outer circle' of potential radio-activists.

Taking these two evaluations of learning, well-being and general experience collectively, we also noted another particularly interesting and positive finding that over-arched more specific findings. The radio-activist groups seemed inspired to have ambitious and 'high-minded' thoughts through being a part of the medium of RadioActive radio. It seems that, potentially, the RadioActive model can inspire 'dreams, curiosity and imagination' in a powerful and yet practical way (through devising and performing the shows). These ambitious ideas can then motivate the acquisition of conceptual and communication skills, related to collaborative and critical or creative discourses and voices, that are in turn expressed through acquiring concrete employability and technical skills, such as things like team-working and sound recording and editing respectively. In other words, RadioActive seems to have the capacity to inspire expressing 'dreams and ambitions' in ways that can then be realized as concrete and quality radio and media content.

4 Reflections from a Motivation Perspective

Given these particularly positive evaluation findings above – what motivational and affective factors led, or may have led, to the success of RadioActive101?

Firstly, and generally, the central idea and concept – of learning within and through the 'space' of radio – is perceived as attractive, 'cool' and directly relevant to the radio-activist learners involved. This was helped by the central idea being tangible, understandable and highly meaningful, e.g. through having dialogue based magazine shows about knife crime, drug abuse, the bullying of learning disabled young people etc. (see http://uk2.radioactive101.eu/broadcast/). It is important to note that this feature was not due to a 'novelty effect' that is often noted when new technologies are introduced. Many of the radio-activists are involved in a series of shows, which span months, and over eighteen months in some cases. For example, some Radio presenters of the UK shows have been involved in the project for over 18 months, since the first live UK broadcast. Indeed, the repeating rhythm and cycle of radio production, over which the radio-activists themselves have control, is itself a motivating feature.

Secondly, the first point above was addressed in terms of design methodology through employing ongoing problematisation [10] of the design space. During the early stage of the project meaningful relationships were formed between the learners, their organizations and the design teams. This created the 'dialogue space' to properly articulate the values, challenges and opportunities that were important to the learner organizations and communities prior to designing the form of the radio interventions. Once the learner contexts were comprehensively understood, and trusting collaborative relationships were established, training and program production began, where the latter was mapped to the substantive issues at play in the lives of the learners.

Thirdly, it appeared, from the interviews and focus groups combined with specific questionnaires, that an initial platform of improved psychological dimensions, such as confidence and general well-being, was essential for the informal learning to occur (of the technical, communication and media literacy skills to create and broadcast radio). These psychological dimensions seemed fundamental to promoting learning, and seem to form a part of the essential landscape for motivated learning. For example, if you lack confidence and self-esteem within a learning situation, it is highly unlikely that you will actively engage and learn from that situation.

Fourthly, once the program production began and live broadcasts were performed there became a clear sense of emancipation amongst the learners and their organizations. Their confidence and sense of self-worth was boosted because they were expressing their voices that had been previously unheard, using a medium that was usually associated with formally well educated people of a 'higher' socio-economic status. This sense, of being able to express their voice within an emancipatory framework of an internet radio hub linked directly to disenfranchised learners and their organizations, was clearly tangible and inspiring throughout all of the RadioActive101 processes

Fifthly, and related to the above, especially the point about confidence, a lot of the learners experienced 'extreme learning', in the sense that they learned to do things that themselves and others previously thought was beyond them. This included things like learning to technically sound engineer and broadcast radio, devise and conduct interviews about controversial topics, produce 'professional' quality sound structures (such as background music that conveyed the emotional tone of interviews). These things were learned precisely because they were catalysed by the desire to present their 'life issues' on the radio, and were not taught as aspects of some curricula divorced from the learners living contexts. This process also gave rise to perhaps the most exciting educational principle, that once disenfranchised learners found that they could do what they had previously thought was not possible, they then asked themselves what else they could learn to do. And related to this, the learners seemed inspired to have ambitious and 'high-minded' thoughts through being a part of the medium of RadioActive radio. It seems that, potentially, the RadioActive model can inspire 'dreams, curiosity and imagination' in a powerful and yet practical way (through devising and performing the shows). These ambitious ideas can then motivate the acquisition of conceptual and communication skills, related to collaborative and critical or creative discourses and voices, that are in turn expressed through acquiring concrete employability and technical skills.

Sixthly, although the Badges process has not been formally evaluated yet, there are early signs and anecdotal evidence from those who have received them. This shows that they are motivating and attractive to our radio-activists along the lines we have described earlier. The way in which they 'make tangible' the informal learning of EU key competencies is highly valuable to making the learning processes both transparent and concrete.

5 Conclusions: RadioActive101, Motivation and 21C Learning

This paper accepts that we have presented a focused reflection on the motivational landscape of one particular project, RadioActive101. This is a nuanced Case Study of a complicated situation that necessitated careful thinking at the design stage and then ongoing observations of the TEL innovation in action. Generalizing and applying our findings to other TEL design and implementation situations is future work.

The evaluation of RadioActive101 shows it to be accepted and successful as an ongoing educational intervention promoting the informal learning of disenfranchised groups, in a number of European countries. The motivational and affective factors that are in play during the RadioActive processes are clearly central to this and intertwined with virtually all of the learning activities. These motivational factors however, do not easily breakdown into notions like intrinsic motivation, extrinsic motivation and the like. Instead, the motivational landscape of RadioActive101 demonstrates complex relationships between learner's conceptions of themselves, their actual or perceived social and cultural positioning, and what is possible and desirable in a world that requires increasingly, what we call 21C skills. It would suggest that studies of motivation and affect, from a TEL perspective, will benefit from being highly investigative rather than prescriptive. It is through a thorough understanding of the learning problem in context, that motivational and affective factors can be emerged, mapped and exploited to promote learning.

RadioActive101 in particular shows that learning activities are motivating because they are both attractive (or cool) and directly relevant to learner's lives, and also when they provide a clear and tangible path to personal and community improvement. In a sense, this is simple, if learning has the perceived and tangible capacity to change our lives for the better – then it will have a good chance of being motivating. Conversely, if the learner doesn't understand why they are learning, and whether it will matter, they are unlikely to be motivated by it. And although this seems amazingly self-evident, the latter occurs far too frequently in traditional educational settings.

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Acknowledgements

The Trouble with Systemic Solution-Oriented Self-E-Coaching

Emotions as Key Factors in Changing Patterns

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Abstract. Current work on an e-coaching tool for self-coaching based on the systemic solution-oriented coaching concept of the "Karlsruher Schule" (School of Karlsruhe) identifies one of the core challenges of self-coaching to be the "Musterzustandsaenderung" (change of pattern state) which is indispensable for effective and professional coaching. It is the core of the concept and is a highly emotional process. In a former exploratory study future coaches trained by the Fuehrungsakademie Baden-Wuerttemberg in Karlsruhe, Germany, were asked for their experience and knowledge relating to the phenomenon of change of pattern state by a qualitative online survey. The present paper deals with the results of this survey and the possibilities of mastering the challenge without interference by a professional coach.

Keywords: Self-E-Coaching, solution-oriented, e-coaching, emotions, pattern state

1   Introduction

Not every coaching offer implies real coaching according to strict definition, because the label of coaching is unprotected and can be used by anyone. With the growing e-coaching market, the need for serious and professional coaching offers and providers is increasing, since personal data are transferred mainly online. In both face-to-face coaching and e-coaching, a special format is often encountered "by the way": Self-Coaching. It means that the coaching process and the single coaching sessions are facilitated and controlled by "tools" instead of a professional coach [1]. This is a challenge not only in paper-pencil forms of self-coaching, but also in e-coaching, particularly when coaching concepts focus on solutions and work with emotions. The central element of the systemic solution-oriented coaching of the "Karlsruher Schule" as applied by the Fuehrungsakademie Baden-Wuerttemberg (Leadership Academy Baden-Wuerttemberg) is the so-called "Musterzustandsaenderung" (change of pattern state). This is the transition from the problem state to the solution state and is meant to support the individual solution finding process by evoking the good feeling of the already

achieved solution state [2, 3, 4]. Interventions to initiate this change of state have hardly been studied so far.

This paper focuses on the interventions that may change the pattern state in self-e-coaching.

2 State of the Art

To obtain a better understanding of the challenge referred to above, the main terms shall now be explained in more detail.

2.1 Coaching

There are a lot of definitions of coaching, but the main idea is to support "the coachees[5] to set goals, develop plans of action, begin to act" [5]. The coaching process should be transparent to the client, pre-structured, voluntary, confidential, limited in time, and without giving advices [6].

2.2 E-Coaching

E-Coaching is coaching provided with the help of technical means [7]. Synonyms like online coaching, tele-coaching, virtual coaching, or web-based coaching are used as well. Three main forms of E-Coaching can be distinguished: (1) professional coaching by a coach with the use of technology to support phases of the coaching sessions or to follow up coaching with the client, also called technology-assisted coaching [8], (2) coaching with the use of pre-structured tools or systems as a primary method [7], and (3) unstructured and informal coaching interventions that are mapped without a formal process [7] and implemented into different electronic tools. For this paper, only the second format is relevant.

2.3 Self-Coaching and Self-E-Coaching

Self-Coaching is coaching without a professional coach, but assisted by pre-structured self-coaching paper-print material, such as questions and tasks in advice literature or special guides. Self-Coaching is discussed very ambivalently in coaching literature, since the view of the client is limited to herself/himself instead of having at least one equal partner (the coach or a peer) for exchange and feedback [9]. In self-e-coaching the material is transferred to digital tools.

In the following table some advantages and disadvantages of self-e-coaching are presented. This list gives a short overview of what self-e-coaching can contribute and where its deficiencies are.

Advantages	Disadvantages

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[5] Plural of coachee: another term for client, the person that is given the coaching.

location-independent	suitability in a crisis situation
time-independent	difficulty to select between serious and unserious offers
ad hoc coaching possible	data protection, security
time saving	higher demands made on the client, e.g. self-motivation or written form
cost-saving	disturbing sources
automatic documentation/ storage	restrictions in means of interventions
higher transfer efficiency	no feedback
Anonymity	costs for software, tool
textualization	acceptance
inhibition threshold low	pace of change in ICT
low liability	reduction of channels
reduction of channels	
new target group	
variety of programs, tools, systems with different media used	

Table 1. Advantages and disadvantages (not structured) of Self-E-Coaching [10]

Especially the restriction in means of interventions is a difficulty as is the reduction of channels when trying to evoke feelings through the coaching process. The reduction of channels, however, may also be helpful in focusing on the chosen or given channel that is being addressed to (e.g. visual channel through pictures, short videos, simple text or auditory channel through music, sounds, voice). One of the biggest advantages in self-e-coaching is the possibility to do coaching ad hoc. Since the use of smartphones is increasing, a self-coaching app can be used directly when needed. It can be used independently of the location, because a smartphone usually is a constant companion. It can be used independently of time, because there is no need to wait for a free time slot of a professional coach and it is cost-saving, since no travel is needed and the self-e-coach is not as costly as a usual coaching session. In all these processes the security of data and the protection of sensitive information of the client are of crucial importance. Since the self-e-coach is no "real" person, but a tool, it is not bound to internal associated or related rules of confidentiality as a professional coach would be. Hence, it is of high importance to make the security and data protection mechanisms transparent to ensure that the client can use the tool without any risks. Except for scientific use, self-e-coaching data do not need to be transferred to a connecting server. Various technical possibilities exist to share data with a professional coach. It may be doubted whether self-coaching or self-e-coaching is suitable for every coaching situation, for example when people are in a deep crisis or there is a conflict between persons. Other formats of coaching or even other counselling formats could be more fitting and self-coaching rather is to be seen as a first aid kit than the complete cure. Another important aspect is acceptance. It is possible that self-e-coaching reaches a new group of clients. This group now benefits from coaching, whereas before they did not want to be involved in such a counselling process. Now they can get involved without anyone needing to know (anonymously). But there will be no feedback and clients will "stew in

their own juice". When using a combined solution, such as peer coaching, individual coaching, group reflection, and others as it is planned for the European project EmployID [1], the situation would be different, of course.

2.4 Emotions in the Change of Pattern State

Emotional regulation and body psychotherapy physically represent feelings and reflect that there are habits and patterns in mental experience and behaviour as well as in the body [11]. Sometimes, only a minimal change induces well-being and mobilizes resources and competences to better solve problems [12].

In their overview of eight success factors for coaching, Greif, Schmidt & Thamm (2010) call one of these factors "affect reflection and calibration". The change of reaction is mentioned by simply being asked for feelings. "The typical observable reaction of the clients is that their emotions are quickly subdued, and that they speak in a different tone. After this, it is easier for the clients to explore and analyse the self." [13]. Greif, Schmidt & Thamm (2010) criticize the rare use of altering affect and emotions in coaching through, for example, psychotherapy or relaxation techniques "that result in the pacification of emotions" [13]. In the Karlsruhe School's coaching, this emotional regulation is accomplished by interventions that initiate the change of pattern state [2, 3].

The change of pattern state is a change of perspective or angle of view. The search for solutions is not performed from a problem state or problem view, but by analysing the steps that led to the desired objective along an objective vision from the solution state. It is not possible and not necessary to delete the malfunctioning problem state. Instead, it is important to focus on the visualized solution state [14]. The pattern state with its focus on the problem or solution depends on the purely subjective emotional evaluation of a client in a situation. Emotions play a decisive role in life and they guide or lead actions [15]. Four components of emotions are also used when working with the change of pattern state:

- The physiological component (psycho-physiological reactions),
- the physical component (e.g. gestures and mimics),
- the affective component (the conscience perception), and
- the cognitive component (thoughts, visualizations, interpretations) [15].

According to modern emotion theories, these components influence each other [15].

Several interventions are used in business coaching to initiate the change of pattern state, e.g.[6]:

- Interventions based on the guide for a holistic change of pattern state by Berninger-Schaefer (2010) that is modified version of a guide of Muecke (2003, p. 400) under consideration of Schmidt (1997) [4].

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[6] Many more interventions could be listed here, but this is intended to be a quick overview only.

- Comparisons that evoke metaphors, imagery, parables in combination with strengths of the client e.g. "Your problem is comparable with… It is like…" [16].
- Activation of resources by asking for previous attempts to find a solution, successful problem solutions, professional successes, personal successes, moments of great pleasure, supporting systems, positive experience with others, strengths and characteristics as well as experience of nature. When taking the resource "experience of nature", for example, the client may recall a sunrise or a thunderstorm. A possible invitation to activate resources might be: "Think of a pleasant experience of nature, what comes to your mind spontaneously? How do you feel when thinking of this experience of nature?" [16].
- Using the miracle questions of De Shazer, e.g.: "Let us assume that tonight a miracle happened while you were asleep and your problem was solved. How would you notice this the next morning? What would be different?" [16].

To obtain more information on the change of pattern state not only from the theoretical, but also from the practical point of view, a study was made.

3   Method

To get a better understanding on the challenge of inviting a client to the change of pattern state in self-e-coaching a former study will be presented in the following that shows the challenge of pattern state that coaches already have to face in face-to-face coaching. For this exploratory study in August 2013, future coaches trained by the Fuehrungsakademie Baden-Wuerttemberg in Karlsruhe, Germany, were asked for their experience and knowledge relating to the phenomenon of change of pattern state by a qualitative online survey. This questionnaire mainly contained dichotomous and open questions, since it was meant to be a first exploration of this main element of the taught coaching concept. In detail, the survey consisted of an introductory question at the beginning, questions relating to the current state of training, questions relating to the change of pattern state, and questions relating to the trainees' socio-demographic background. The questions on importance, difficulty and success of the change of pattern state were rating scaled questions [16]. In addition, searches on the theoretical construct were conducted in practical as well as in scientific literature.

4   First Research Results

Of 283 participants in the business coaching training, 51 persons took part in the online survey (47% female, 53% male, age $\varnothing$ 47 years (min= 22 years, max= 61 years). The survey was evaluated descriptively and qualitatively. The results relevant to this paper's topic are as follows:

98 % of the participants in the business coaching training agreed that the change of pattern state in coaching is important (71%) or quite important (27%) to the coaching session even though not everyone had been successful in initiating the change of pattern

state in his or her coaching sessions until then. 30% answered that they had been occasionally and 4% rarely successful. This illustrates the impact of the phenomenon in coaching. Of the variety of interventions to initiate the change of pattern state, the participants indicated to an open question on their preferred intervention that they use the miracle question (12x), time and imagined journeys (6x), or resource activation associated with hobbies and pleasant experience (3x). Four of 51 answered that they had no special preferences in their interventions and five of 51 replied that they would select their intervention method depending on the client. One additional comment of a participant was that it is important to be sure that the client is fully in the solution state and that he or she stays there for the further coaching session. The change of pattern state, hence, needs to be holistic and to combine all levels of a pattern state (emotional, cognitive, behavioural, and physiological) [16].

When recalling their own experience gathered by being invited to the change of pattern state, while being in the role of a client, the participants listed several observations. Main descriptions used for the change of pattern state were: Liberating (6x; "blockages are cleared"), creative, relieved, encouraged, and energized (4x), opening (5x), motivating. It was a positive feeling (2x), "hope that own ideas can be realized". One participant wrote: "In the problem state I was close to tears. Through the change of pattern state, I started to smile and I was sitting upright and more self-confidently on my chair." Three other participants wrote: "new possibilities of action opened up". The change of pattern state is described as a "view into the inner reality" and a "physically perceptible state of positive energy" (3x). These observations were all based on experience gained in face-to-face coaching. They show the effects of the interventions and the achieved state after the interventions and exactly these effects and this state need to be achieved by a self-e-coaching tool, too. The setting and the support might change, but the effect and the results need to stay the same.

An additional question in the online survey was whether the participants could imagine the change of pattern state in a setting other than face-to-face (e.g. via telephone or e-mail). 75% of the participants answered in the affirmative [16]. This is a very important result, as for e-coaching the change of pattern state will have to be initiated from a distance and with different tools or media used. On the telephone, the change of pattern state would be possible through verbal expression only. It needs communication skills that differ from those of face-to-face coaching that is supported by mimics, gestures, and other factors. It also needs different skills for the coach to listen. In e-mails the communication is of textual character only. This again requires different skill sets of the coach and client, as was already mentioned in the advantages and disadvantages of self-e-coaching. Still, the participants in the online survey mostly think that this is possible.

5   Discussion

How can the change of pattern state be implemented in a self-e-coaching tool?

To answer this, possible interventions need to be taken into consideration. The challenge in self e-coaching is that the coach is not able to intervene as it is usually done in

coaching with another person. Without the possibility to use communication to change the process, there is a need for "strong" interventions without any further questions or delays. As already mentioned, however, little is known about possible interventions and how successfully an intervention works, especially when it is modified to fit into a self-e-coaching tool.

Interventions might be classified according to how they address the client. At the moment, mainly auditory (music, recorded voice) or visual (writing or pictures) interventions are applied or a combination of both (videos). Interventions may also be classified by the ways the client can respond: Auditory (recording) or visual (notes, filled-out forms, drawings, taken pictures) or both (video recording, e.g. a video diary) [17, 18]. Differentiation may also be based on the level of interactivity and the availability of automatic feedback. A possible classification is illustrated in Table 2 that is mainly derived from literature and self-e-coaching market research.

A study made in 2010 was aimed at identifying the change of pattern state not only by observation, oral statement of the coach or client, and process flow, but also by psychophysiological parameters. The heart rate, the respiration rate, and electro dermal activity were measured by comparing the baseline of each individual with the data right before, during and after the change of pattern state. It could be observed some slight changes. However, the results were not as clear as it had been expected. Due to the high interpersonal differences, measurements could only be evaluated individually. Standardized evaluation of emotional states simply was impossible at that stage [4, 19]. The psychophysiological data, if presented in a user friendly, understandable way, could be used as an indicator for e-coaching. An evaluation of the data might be another possibility to determine the individual, automatic feedback instead of using the usual generalized texts with congratulations on the progress during the coaching process, reminders to go on with the work or proceed from achieved milestones, stars or other forms of "gamification" incentives as feedback and motivation.

Intervention	Channels via which the client is addressed		Channels via which the client responds		Level of interaction	Automatic feedback
	Auditory	**Visual**	**Auditory**	**Visual**		
Guide for a holistic change of pattern state	Music, recorded (ques-tions	Simple text or pictures il-lustrating the different questions	Possibility to record answer	Possibility to take notes, photos, draw a picture	From re-cording to creating text to cre-ating pic-tures	Automated structuring of answers or collage
	Video with the questions taped, music and appropri-ate background pictures		-			
Comparisons	-	Simple text to be com-pleted or pic-tures to be chosen from the system or own collec-tion	Possibility to record answer	Textual or by adding a picture	From text to creating a picture on the compar-ison	A picture of the com-parison that the client can chose from that shows the meaning of the com-parison.
	-		Answer is recorded while the picture is cre-ated to document the process			
Activation of resources	Music, recorded voice with questions	Simple text to be com-pleted or pic-tures that can be chosen from the sys-tem or own collection, resource wheel/tree with expla-nations	Possibility to record answer	Textual or with a pic-ture or a photo added on	From re-cording to creating text to cre-ating pic-tures	Automatic structuring of the an-swers or collage or a video tape
	Video with a sequence on e.g. a beautiful sunset with recorded questions		Adding video material to the answers			
Miracle question	Music, recorded voice with question	Simple text or pictures fitting the different questions	Possibility to record answer	Possibility to take notes, photos, draw a picture	From re-cording to creating text to cre-ating pic-tures	Automatic structuring of the an-swers or collage

	Video with the questions taped, music and fitting background pictures	-		

Table 2. Use of interventions in a self-e-coaching tool (own table, based on literature search)

The simplest way to identify a change of pattern state seems to be working with standardized questions. They are already used frequently, examples being the miracle question or questions relating to the change of pattern state asked by the guide. Answering these questions is supposed to lead to the change of pattern state, at least in theory. When trying to initiate the change of pattern state in face-to-face-coaching, quite a few of the participants in the exploratory, qualitative study mentioned in the beginning had problems in doing that. Since the process is not linear, there may be feedback loops from the solution state back to the problem state that cannot be prevented. In the case of self-e-coaching, they cannot even be detected[7] and not be adjusted, as it would be possible in face-to-face coaching.

Identification of a change of pattern state might be supported by technical means, such as music to enhance relaxation or an invitation to an imaginary journey which is one of the favourite methods of the participants in the survey. A relaxation method, maybe a respiration exercise or a type of progressive muscle relaxation, might be applied. Such methods provide access to other ways of thinking, as the distance between the client and his current problem is increased. This could even be enhanced by showing relaxing pictures, such as a beautiful landscape or a video on a walk in a forest or a dive into the sea. These technical means contribute to accomplishing this process smoothly. In face-to-face coaching, extra time might be needed for their use during the sessions, because the different "media" come from different sources.

But still it cannot be controlled whether the client is in the solution state or not, irrespective of the intervention made. When coaching takes place with a professional coach simply asking the client, observing the person's mimics or gestures, or just listening to the way the voice changes, the coach may be able to identify a change of pattern state. In contrast to this, a self-e-coach cannot "observe" these indicators as it can be done by an experienced coach.

This does not imply that self-e-coaching is not successful at all. But it is lacking an important success factor that is crucial to the quality of coaching.

5 Conclusion

Since e-coaching is still in the process of being established with more and more technical tools specially developed for this purpose [18], there is great need for testing interventions. But like in e-learning, simple transfer of what is done in face-to-face coaching to e-coaching is not the solution. Appropriate technical means should be used to support interventions in a modern way. These technical means may even produce different or new interventions suited for coaching. Different approaches may be pursued:

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[7] At the moment it cannot be detected. It could be though when combining self-monitoring with different psychophysiological parameters with the self-e-coach.

- One possible way is to find out what has already been used successfully in face-to-face coaching or in paper-pencil self-coaching. Then, it is important to find out how these interventions may be transferred from face-to-face or paper-pencil to self-e-coaching. This approach is very pragmatic it begins with the research on already existing solutions only by transferring it into the new form. But it may lead to missing out the possibilities that new media might be having for self-e-coaching.
- Another way is to start with already existing interventions that can be transferred easily and to test them for their efficiency. This approach starts not with the coaching process but with the interventions itself. Problem could be that the separation of the process leads to complications when uniting again.
- Another approach is to examine the core aspect of the existing interventions and to create a completely new intervention based on the developmental knowledge. This may be supported by psychological studies of what causes the emotions and of the effects of emotions on learning, working, etc. Motivational aspects, especially intrinsic and extrinsic motives, should also be considered in this context. This approach would be the more sophisticated way based on research and not on practical experiences and is also very close to creating patterns on interventions.

This means that in any case more research into e-coaching is needed, especially into channel usage and possible interventions. It also appears to be important to find a way to monitor emotional processes in the course of coaching with a view to obtain objective information on changes and to work on ideas of how to prevent feedback loops or how the system can react when changes can be measured.

Moreover, it is important to focus on initiating emotions with the help of technical means when a professional coach is lacking. Some first ideas can be derived from this paper, but these ideas remain to be implemented and tested carefully.

Acknowledgement

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Comparing Objective and Subjective Methods to Support Reflective Learning: an Experiment on the Influence on Affective Aspects

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Abstract. We conducted an experiment to investigate the influence of objective and subjective methods to capture affective aspects. We used a sensor to measure participants' heart rate and a mood map where participants could report their emotional state. Results showed that the display of the heart rate had more influence on the self-reported valence dimension than on the arousal dimension. In this paper, we discuss several ideas why people might act this way and raise those ideas for discussion. The discussed reasons may change the way how people feel when they see their heart rate. If some of the reasons apply in reality, this could change the way we use objective methods to capture and make affective aspects aware in TEL.

Keywords: objective method, heart rate, sensor, subjective method, self-report, mood map, arousal, valence.

1 Introduction

In technology enhanced learning, affective aspects are important in several manners: they can constrain or serve someone while learning [2], they can be cues to remember events [11, 17], or they can be the subject of learning, as in emotion regulation [10, 12]. Affective aspects like emotional states or physiological reactions can be captured with self-reporting techniques or with sensors [12, 13,16], but also with a combination of both. Data captured with self-reported techniques offer a subjective perspective on emotions, whereas data from sensors can be a reference point that delivers an objective perspective. Although so far no physiological parameter by itself could represent a special emotional or affective state, a vast amount of rese arch has investigated which parameters may be a cue or indicator of certain emotions [9, 19]. The comparison between using subjective and objective approaches has also gained attention in scenarios not related to learning, e.g. to assess physical activity levels [21].

Boud et al. [2] define reflective learning, i.e. learning from own experiences, as "those intellectual and affective activities in which individuals engage to explore their experiences in order to lead to new understandings and appreciations". The learner's

context makes up the objective and environmental experience that can be compared to the subjective experience of the learner in order to make sense out of it. This comparison can lead to discrepancies as subjective and objective experiences differ in their underlying perception of situations as well as in their interpretation of the gathered data [15].

To gain insights about the differences between using objective and subjective methods to capture affective aspects and how they influence the user, we designed and conducted an experiment. In this experiment, we employed a heart rate sensor to measure participants' heart rate [3, 16] and a self-reporting tool (mood map [12, 13]) to capture their emotional state. We chose these two capturing methods in order to have an automatic approach that offers an objective perspective in comparison to a self-reporting approach which shows the subjective perspective of the user. The experiment aimed at examining if there are influences on participants when they were shown their current heart rate and how this influence looks like. After the experiment, they had to remember certain events which occurred during the experiment. While remembering the events, the data gathered with both methods were reported to the participants.

2 Capturing Affective Aspects: an Experiment

According to cognitive dissonance theory [4], there is a tendency for individuals to seek consistency among their cognitions (i.e. beliefs, opinions). When there is a mismatch or psychological discomfort (dissonance) between attitudes and behaviour, it can lead to rethinking attitudes and experiences. Cognitive dissonance is also experienced by an individual when confronted by new information that conflicts with existing beliefs, ideas or values. This conflict may be originated also by discrepancies between the objective and the subjective assessments of own emotions. Therefore, our hypotheses are that the visualization of the individuals' heart rate (a) could influence them in their self-report and (b) could act as memory cue (trigger) and make participants remember a higher number of events.

2.1 Experimental Design

We designed an experiment with two groups ($N = 75$, $M_{age} = 23.3$, $SD_{age} = 2.8$, 38 female, 37 male, most of them being students). The treatment group ($N = 32$, $M_{age} = 22.5$, $SD_{age} = 2.5$, 17 female, 15 male) used a self-reporting method to capture their emotional state (subjective) while they were shown their heart rate measured by the sensor (objective). Subjects in the control group ($N = 43$, $M_{age} = 24.0$, $SD_{age} = 3.0$, 21 female, 22 male) had only the subjective perspective, i.e. they used only the self-reporting method without seeing their monitored heart rate. For self-reporting, we used an adaptation of the mood map [12, 13], a tool developed in the MIRROR[8] project to support reflective learning on mood.

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[8] http://www.mirror-project.eu

The mood map is a two-dimensional affect scale consisting of arousal and valence. It is based on the Circumplex Model of Affect [23] which defines every affective state as the linear combination of two dimensions: valence and arousal. The heart rate was captured by a movisens ekgMove sensor [14] and the history of the last 60 seconds was displayed to the participants. The heart rate and the mood map were displayed on a Samsung Galaxy Tab 10.1N tablet computer. The tablet was placed in front of the participants so that they could easily input their emotional state without executing considerable movements.

At capturing stage, we showed 12 emotional film clips [6-8, 20, 22, 26] which aimed at creating several experiences during the experiment, analogue to the experiences that are the basis for reflective learning. The film clips were extracted from feature films and contain scenes which target at provoking certain emotions: neutral *(All the President's Men, Hannah and her Sisters)*, fear *(Halloween, Silence of Lambs)*, disgust *(Pink Flamingos, The Godfather)*, anger *(Gandhi, My Bodyguard)*, sadness *(An Officer and a Gentleman, The Champ)* and amusement *(When Harry met Sally, An Officer and a Gentleman)*. For all film clips, the German dubbing was used. The duration of the film clips was 2:11 minutes on average and 26:16 minutes in total (with 54 additional seconds after each film clip for mood self-reporting; 10:48 minutes in total). The film clips were shown on a LCD monitor in front of each participant. To control confounding variables, the participants were separated by cabins, wore headphones, the ambient light was switched off and the blinds were lowered.

After each film clip, the participants reported their emotional state using the mood map (Fig 1). After the 12 film clips were shown, the participants filled in a questionnaire.
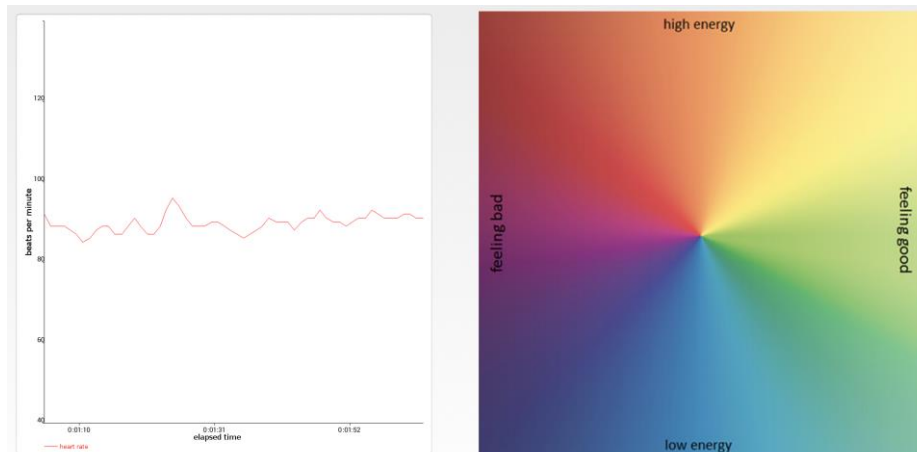

Figure 1. App for treatment group at capturing stage with heart rate display *(left)* and mood map *(right)*

Amongst other questions in this questionnaire, the participants had to write down any events of the film clips they remembered. At this stage, the app changed to the

reporting view (Figure 2) and displayed the history of the gathered data, so that participants could use it as a cue.

Figure 2. App for treatment group at reporting stage with heart rate history and mood history from first to last film clip

In the subsequent analysis of the results, the remembered events were checked by the investigator and a film clip was marked as remembered when at least one event in the film clip was remembered correctly. The gathered data of the questionnaire and the data of the mood map for each film clip were analysed with t-tests (normal distributed values) or Wilcox-Mann-Whitney-Tests (if no normal distribution given).

2.2 Results

No differences regarding the number of remembered film clips were found between the groups ($p = 0.612$, control group: $M = 7.7$, $SD = 3.1$, treatment group: $M = 8.0$, $SD = 3.2$). This suggests that visualizing the heart rate does not increase or decrease the number of events the participants remember when reflecting on it. Nonetheless, the analysis of the gathered data revealed a remarkable difference regarding where they placed their emotional state on the mood map. As the mood map consists of two dimensions (arousal and valence), we investigated how both dimensions differ between the groups.

The heart rate describes the physiological state of the participants, and the arousal dimension of the mood map also describes the physiological state (i.e. the self-report about whether they feel sleepy or excited). Research on the link between physiology and affect, e.g. in the xDelia project, has indicated that constantly measured heart rate is a proxy for arousal [18].

Therefore, we also analysed if the heart rate and the value of the arousal dimension show similar trends and values. The results showed that there were only few significant

results with respect to arousal levels ($p < 0.1$): in 2 out of 12 film clips, the arousal differed (two-tailed tests, $p_{1...12}$ = (0.936, 0.429, 0.557, 0.540, *0.057, 0.340, 0.873, *0.011, 0.620, 0.167, 0.849, 0.430)). However, the relationship with the valence dimension presented significant results in several film clips ($p < 0.1$). In 6 out of 12 film clips the value of the valence dimension differed between the groups (two-tailed tests, $p_{1...12}$ = (*0.086, 0.298, 0.456, *0.052, *0.017, *0.018, 0.877, *0.006, *0.083, 0.861, 0.414, 0.446)). This means that participants who saw their heart rate reported different valence levels compared to those participants who did not see their heart rate. This impact of visualizing participants' heart rate was an unexpected effect and therefore we believe it is worth further discussion and investigation.

3 Discussion

After obtaining these results, several aspects had to be considered. Firstly, this result was not the expected outcome as it was believed that the participants would potentially map their heart rate to the self-report of their arousal. Instead, the results show that not the arousal but the valence is influenced by whether they saw their heart rate or not. As the experiment was not designed to study this fact, no conclusions about possible underlying reasons could be recognized yet. However, we consider several ideas and hypotheses.

At first, we take a look on the physiological background of the heart rate: usually an individual has a certain resting heart rate. Her heart rate will rise if she is stressed or certain emotions occur. On the other hand, her heart rate will fall if she is relaxed [24,25]. Consequently, there is a neutral heart rate and a deviation of this neutral heart rate depending on the situation.

Said what the heart rate is physiologically depending on, we should think about what people actually associate with (a) a rising/falling heart rate and (b) the mere display of the heart rate at all.

A possible reason is that we may associate a low/falling or high/rising heart rate with a negative or positive (or vice versa) feeling. But a problem arises with this assumption: is it even possible to associate a high heart rate with a negative or positive feeling? An emotion of anger as well as being amorous will result in a high heart rate – the first one is a negative feeling while the second one is a positive feeling. There is probably the same problem for a low heart rate: it can be easily associated with being bored (probably a negative feeling) or with being deeply relaxed (probably a positive feeling). Therefore, it is rather unlikely that a subject establishes this wrong association between heart rate and valence. Nonetheless, further experiments would be needed to investigate this aspect in detail.

Another possible reason is that people might just feel (un)comfortable about having a computer surveying and displaying their heart rate. They might feel (un)com-fortable about the fact that they are aware of their heart rate (e.g. a well-trained person who likes to see her low heart rate, or a person which has issues about her high heart rate).

The reason might be related to cognitive dissonance too: a person might think that she is relaxed – or she is just not aware about her current heart rate. At the time when

she looks at the visualization of the heart rate, she becomes aware that her heart rate had actually risen: this might cause a cognitive dissonance, i.e. there are two perceptions that do not fit mentally. This might cause feeling uncomfortable.

Eventually, the reason could also be that people refuse or approve the objective method to gain information about their physiological state. If they are open minded and interested in the technology, they may have a higher valence in general compared to a lower valence if they are not (whether it is wittingly or unwittingly).

Finally, the context where the experiment took place should also be considered. Although the study was conducted within the EU Project "MIRROR – Reflective Learning at Work", the study had no setting related to the workplace, but was conducted in a lab setting. However, future studies should be conducted also in work related settings to investigate how we deal with emotions as well as the physiological reactions they lead to in the workplace. Showing emotions is often not welcome at the workplace, and we are probably often quite good at fulfilling this expectation [1, 5]. However, most people will probably fail to control their physiological reactions. This means their heart rate will still rise and even lead to more stress (and of course, the initial negative emotion would still exist).

4   Conclusion

We conducted an experiment to investigate the influence of objective (display of the heart rate) and subjective (mood map) methods to capture affective aspects. Our experiment reveals that there were no differences in the number of remembered experiences but the display of the heart rate had an influence on users' self-reported affective states. However, contrary to the expectations, the objective method had more influence on the valence dimension than on the arousal dimension. In this paper, we stated first ideas why people might act this way and raised those ideas for discussion.

The discussed possible reasons why displaying the heart rate has a higher influence on users' valence than on arousal levels include: (a) people may associate a deviation from the neutral heart rate with a positive or negative feeling; (b) people may feel (un)comfortable about a computer surveying their heart rate; (c) people may feel (un)comfortable about being aware of their heart rate; and (d) a wrong estimation of their heart rate followed by being aware of their real heart rate may lead to a cognitive dissonance. These reasons, if they apply, have in common that they may change the way people feel when they see their heart rate.

If some of the stated reasons apply in reality, this could change the way we use objective methods to capture and raise awareness of affective aspects in TEL. These facts should be taken into account and avoid that subjective assessments are influenced by objective measurements if this is undesired. Therefore, we want to raise these reasons for discussion and open new trends for further investigation.

Acknowledgement

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MATEL 2014: Towards Developing a Pattern Collection

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The 2014 edition of the MATEL workshop has focussed on pushing the ideas of motivational patterns further. Since its beginnings, the MATEL workshop series' mission has been to promote the systematic inclusion of motivational aspects into socio-technical design processes. As part of MATEL 2013, "from art to engineering" has been identified as the general theme to push the topic further. In other disciplines, ranging from architecture to software engineering or education, pattern-based approaches have been used to capture experiential knowledge about successful and unsuccessful introduction processes, design ideas, organizational measures, among others.

During the workshop, around 20 participants were sharing their experiences with respect to TEL tools and motivational problems encountered. The contexts ranged from schools, university teaching to workplace learning.

In the morning, we had three research presentations:

- Ingo Dahn from the University of Koblenz-Landau presented results from the RadioActive project, and especially experiences with applying Open-Badges for young people.
- Carmen Wolf from the Karlsruhe Institute of Technology presented on the role of affective aspects in self e-coaching.
- Verónica Rivera-Pelayo from the FZI Research Center for Information Technology presented the results of an experiment on affective aspects to compare objective and subjective capturing methods.

After the presentations, we introduced an initial proposed pattern structure, which included the following sections:

- Name (name of the pattern; is easy to remember and meaningful)
- Category
- Abstract (outlining key elements)
- Problem (description of observable problem, close to the actual situation encountered, but reduced to characteristic elements)
- Context (description of the type of context the solution is applicable to, makes assumptions explicit under which the analysis and solution operate)

- Analysis (why is solution needed, interpretation of the problem, particularly in the light of motivation and – possibly – relate it to useful theories or other conceptualizations)
- Known Solution(s) (possibility to have more than one solution or is that different pattern?)
- Diagrammatic representation of solution (graphic illustration)
- Example
- Related patterns(for similar patterns, e.g., with variations of problem or context)
- References (evidence, references to theory)
- Authors, Date, Acknowledgements

In the afternoon, the workshop participants developed a first pattern and gained experience with the proposed pattern structure.

In general, the participants have gained confidence in the usefulness of a pattern-based approach. Several key aspects relate to create a sustainable process. This includes:

- In general, patterns should be articulated towards asking questions and towards action.
- The section describing contextual assumptions needs further elaboration and appears to be one of the most critical.
- Ordering of sections depends on whether you are creating or using a pattern.
- Patterns are not just about structure; they are also about learning (i.e. usage) and creation processes. The creation process involves collecting examples, extracting common relevant factors, contextual conditions, and common problem and solution descriptions. This is a discussion process. Then the pattern description needs an argument to connect the problem with the relevant contextual factors
- The development of patterns is a knowledge maturing process, and it will be important for the community to be aware of the maturity of the descriptions.
- With the pattern base growing, a shared vocabulary will be needed to allow users to search for the patterns efficiently.

The workshop participants intend to continue the conversation as part of online meetings towards the development of an initial core of a pattern catalogue.

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About the Editors

Teresa Holocher-Ertl

Teresa Holocher-Ertl studied Economics at the University of Vienna with a focus on Organisational Learning. Her current fields of work are user-centred technology development and evaluation and motivation in technology enhanced learning. She participated in several research projects in the 6th and 7th Framework Programme of the EC involving different stakeholder groups, like employees, teachers, retirees, housewives and young migrants in the requirements elicitation, design and evaluation of new technical systems. Currently she is working as a senior researcher at ZSI - Centre for Social Innovation, in Vienna. Prior to her involvement in research projects she was working as interface between end-users and designers of socio-technical innovations in the private sector. She is now Work package leader on Evaluation and Impact assessment of the EmployID project (FP7), which aims to support identity transformation of Public Employment Service practitioners in times of changing labour markets.

Christine Kunzmann

Christine Kunzmann studied human resource management at the Pforzheim University of Applied Sciences in Germany. She is an HR consultant with special focus on competence management, human resource development and inter-organisational process design for health care institutions. As part of her activities, she has developed a widely accepted reference model for closed-loop approaches to competence management. Since 2008, she has also been researcher in the MATURE project where she conducted ethnographically informed studies and explored motivational barriers to knowledge maturing activities and ways to overcome them. She has been continuing this research in the Learning Layers project, and has initiated the Knowledge Maturing Consulting network. She has initiated and organised the international workshop series on Motivational and Affective Aspects in TEL at EC-TEL, M&C, and Professional Knowledge Management conferences. Her research interests include competence development and organisational development from a Human Resources perspective, particularly focusing on motivational aspects.

Lars Müller

Lars Müller studied Information Technology at the University of Cooperative Education in Stuttgart completed a Master in Computer Science and Information Management at the University of Augsburg. He worked for three years at IBM Germany at this time before he started his research career at the Fraunhofer Institute for Communication Systems in Munich. Since 2010, he has been working at the FZI Research Center for Information Technology in Karlsruhe. He led the work package "Capturing Learning Experiences" in the EU project MIRROR and received his PhD on sensor-based support for reflective learning from the Karlsruhe Institute of Technology in 2014. His research is focused on applying sensor technologies to induce behavioural change.

Verónica Rivera-Pelayo

Verónica Rivera-Pelayo studied Informatics Engineering at the Universitat Politècnica de Catalunya (UPC Barcelona Tech). In October 2010 she finished her senior thesis at SAP Research Center Karlsruhe within the scope of the FP7 Integrating Project MATURE. Since January 2011, she has been working as a research scientist at FZI Research Center for Information Technology in the research division Information Process Engineering (IPE). She has been working in the team of Prof. Rudi Studer within the competence areas "Knowledge & Learning" and "Semantic Technologies". She was involved in the EU FP7 Project MIRROR, *Reflective Learning at Work*. Her research is focused on the capturing and visualization of relevant data for workplace learning and the development of tools to support it. She has received her PhD on design and application of self-tracking tools (Quantified Self approaches) for reflective learning in the workplace from the Karlsruhe Institute of Technology (KIT). Her main interests include Technology Enhanced Learning, Learning Analytics, Human Computer Interaction and Mobile Technologies.

Andreas P. Schmidt

Andreas P. Schmidt is professor for enterprise social media and mobile business at Karlsruhe University of Applied Sciences since March 2012 and has co-founded the Institute for Learning and Innovation in Networks. Before that, he was working at FZI Research Center for Information Technology, a technology transfer centre at KIT with a specific focus on regional SMEs, as a department manager for the knowledge area "Knowledge & Learning" and lecturer at the faculty of computer science at KIT for information integration. He has received his PhD on context-aware support for work-integrated learning from University of Karlsruhe. He has significantly contributed to various European projects over the last ten years. He has been Scientific Coordinator for the FP7 Integrating Project MATURE and was the initiator and key researcher on the knowledge maturing model and has also initiated the open source solution for light-weight competence management based on people tagging (SOBOLEO), and work package leader in the FP7 project MIRROR. He is now work package leader in the FP7

project LAYERS. His research interests include evolutionary perspectives to collaborative knowledge development and modelling, lightweight semantics, and supporting informal learning at the workplace.

Carmen Wolf

Carmen Wolf studied Vocational Education and Training and General Pedagogics as main subject and English studies as minor subject at Stuttgart University from 2005 to 2008. She completed with the academic degree bachelor of arts. From 2008 till 2010 she studied General Pedagogics with focus on Vocational Education and Training at Karlsruhe Institute of Technology (KIT) and completed with the academic degree master of arts. Since 2011 she is academic staff at the Institute of vocational education and training at KIT and qualifies herself part-time as a certified professional business coach. Her research on coaching started with her master thesis and continues with her PhD project as well as the introduction of coaching into her teaching and the offer of free coaching for her students. Her main focus is systemic-solution-oriented and resource-oriented coaching, teaching and learning concepts, e-learning, e-coaching, microlearning and learning theories. Since beginning of 2013 she is accepted as a PhD-student at the Faculty for Humanities and Social Science at KIT and accomplished her further studies to be a certified professional business coach at Fuehrungsakademie Baden-Wuerttemberg (Leadership Academy Baden-Württemberg, Karlsruhe) in October 2013. The further study offer is certified by one of Germanys well-known and most influencing coaching federation "Deutscher Bundesverband für Coaching (DBVC e.V.) (German Federal Association for Executive Coaching)". Carmen Wolf is since November 2014 CAI©-certified Online-Coach which she achieved in a further training on virtual, multimedia Online-Coaching offered by the Karlsruher Institut fuer Coaching, Personal- und Organisationsentwicklung (KIC) and CAI GmbH. Currently she is active as expert on coaching and training in the EU-funded project EmployID.