FIRST STAGES OF ADULT STUDENTS' RELATIONSHIP TO SCIENTIFIC KNOWING AND RESEARCH IN THE OPEN UNIVERSITY`S WEB-BASED METHODOLOGY COURSE

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ABSTRACT

The adult students who participate in the web-based studies of the open university have in many ways heterogeneous starting points for studying and learning, for example, the educational backgrounds, the acquired work experience, the general academic skills and the objectives of the future can vary considerably. The adult students striving from the different starting points pursue their own individual objectives and the set educational dimensions of the academic education.

In the academic adult education, individuality and the adult student's autonomy are emphasized and at the same time, diverse knowledge, skills and understanding are sought after. One key objective of the higher education is the development of the scientific thinking and refining of personal epistemology and the readiness for their complementary reflection. The personal relationship of an adult student to the scientific knowledge and, at the same time, the academic identity are based dialogically and process-like in the dynamic and complex interaction field of cognitive, emotional and social factors. The adult student's genuine and profound learning experience touches personal epistemology and is strongly connected to the individual's meta-cognitive and cognitive processes. Furthermore, the feelings which are related to the adult student's study and the social life field are involved in the process.

In our article we examine the open university's adult students' personal relationship to science and to scientific knowledge which is structured gradually and in a process-like fashion. The examination adheres to the situation at the beginning of the open university e-learning course in qualitative methodology and on the students' own reflection. We focus the examination on those adult students who did not have earlier experience of carrying out research or of the methodology of qualitative research when the course in qualitative methodology began. The research material consists of the learning diaries the students (N= 41) kept during the course, the diaries which were also a part of the course work. From the material, five different personal, academic science relationships crystallize through a material based content analysis: outsider, superficial, timid, critical realist and user of the expert knowledge. Finally we present e-pedagogical conclusions as a summary of how the adults' learning process can be supported when aiming for the thinking which integrates personal everyday knowledge and scientific knowledge and how the commitment to the development of one's own thinking can be reinforced.

1. THE CONSTRUCTION OF THE ADULT STUDENT'S PERSONAL RELATIONSHIP TO SCIENCE

The research field of scientific thinking and epistemology is wide and scattered both theoretically and methodologically (Buehl & Alexander 2001; Hofer 2004; Khine 2008). However, the different trends have been united by their strong tradition of theory which connects them to cognitive and developmental

psychology. The empirical studies concerning personal epistemology have often applied to the university students (for example, Brownlee et al. 2009; Fulmer 2014; Richer & Schmid 2010; Spray et al. 2013) or teachers (Felbrich et al. 2008; Borg 2009), whereas the special starting points relating to epistemology and to the personal relationship to science of the adult students or particularly of the open university students have apart from some exceptions (Kasworm 2003; Kasworm 2008; Kallio 2011; King & Kitchener 2004) received little attention. The researchers of academic adult education are calling for better attention to be paid than before to the the adults' life fields (work, studying, family etc.) and adult students' earlier knowledge and experience (Malinen 2000) in the research concerning the epistemic beliefs and academic study. (Kasworm 2003; 2008.)

From the point of view of learning, the epistemic reduction of personal relationship to science which concerns scientific knowledge merely to the cognitive examination ignores emotional and social dimensions of learning which are essential from the point of view of an adult's learning experience. As the criticism of the purely cognitive basic starting point the opinions have emerged with education philosophical and sociological orientation, and in these the theoretical and methodological changes are proposed or required for the research of the epistemic beliefs and epistemology. The research tradition which stems from psychology has been criticized for the objectifying theories and models with similarities to personality theories and at the same time the writers who have orientated philosophically have tried to extend this research in the direction which takes into consideration the holistic conception of man and the contextual nature of thought. (Niessen et al. 2008.)

These additions concerning the starting points and processes of learning open new opportunities also for the examination of the personal *science relationship* of an adult university student. Then the dimension of learning which is related to scientific thinking and epistemology can be examined - not only as a cognitive development continuum or as a belief dimensions - but above all as a *personal relationship to scientific knowledge and knowing which is constructed individually and in process-like fashion in the adult student's life*. This kind of hermeneutic approach which aims for understanding binds the cognitive dimension to be a part of the adult's life field and relationship to science.

The beginning of the academic studies or of the study module is a stage which is central from the point of view of building the science relationship. At the orientation stage the adult student evaluates the possible meaningfulness of the future study process and one's personal commitment to the contents to be studied. The students reflect upon and evaluate their starting points, the demands of the study module and the support available. In an open university, the student's personal situation in life, possibly the new demands of e-learning and the physical detachment from the place of study and from the studying community restrict this commitment. These factors together with the earlier studying experiences and with the own capability beliefs have an effect on the personal significance network concerning the studies and the life field taking shape. An adult student also builds the personal relationship to science in this life field in the interaction with the teacher and possibly with other students. In our study we focus on examining the beginning stage of the web-based study module which is important from the point of view of the studies and the construction of the relationship to science.

2. WEB-BASED METHODOLOGY COURSE OF THE OPEN UNIVERSITY AS THE CONTEXT OF BUILDING THE RELATIONSHIP TO SCIENCE

Equal and individual supervision and treatment of students are connected to the basic values of the open university education which is a context of this study. In the starting points of the open university studies the clear restrictions and conditions are also realized, to which attention must be paid in the organization of the education and in the teaching of contents. The education is web-based and the assignments are applied in which case an adult student's earlier knowledge, practical experiences and new knowledge can bind themselves seamlessly and authentically (Malinen 2000) to each other. The pedagogical objective is to make profound learning possible and to help adult students to realize the stages of their own learning process – especially concerning personal epistemology.

In the article the novice students of the open university and their personal relationships to science are examined at the first stage of the methodology course. The methodology course of qualitative study (5

credits) in question was a compulsory part of the pedagogical candidate study module. The methodology courses are a central part of academic education in many ways. Students should at this stage at the latest become conscious of the processes of scientific knowledge, realize the demands of science and at the same time they should adopt the concrete stages of the study process and acquire the skills for carrying out a small-scale study. The contents and skills that have been adopted at the earlier stages of studies are set as the subject of the conscious examination and at the same time the students have to think about their own relationship to scientificity and to scientific knowledge.

3. METHODOLOGY

3.1 Research task

The purpose of the study was to clarify how the novice students of the open university position themselves in relation to scientific knowledge and to research at the beginning of the web-based methodology course.

Term novice students refers in this study to the students at the first stage of the pedagogical studies of the open university who according to their own learning diary, do not have earlier experience or have only a little theoretical knowledge of writing a scientific thesis of research practices.

3.2 Learning diaries as research material

The study module of qualitative methodology was implemented as a whole as web-based. The teaching consisted of recorded lectures, live and recorded supervision, the learning diary and online examination. The learning diaries written by the students during the study module were used as the research material. The learning diary consisted of five parts of assignments which progressed according to the qualitative research process. Furthermore, the students were given instructions to record their own thoughts in the form of a diary in connection to the contents of the study module. The literature and the lectures of the study module were to be utilized in the learning diary so that the student's own reflection of the contents was at its centre.

The initial instructions were to examine one's own relationship to scientific information and to carrying out research. With this, an attempt was made to get the students to think about the research orientation just through their own everyday conceptions and their concrete relationship. The examination of this dimension opens meta-cognitive processes and enables the "thinking aloud" -reflection from personal understanding and academic perspective on the central contents. From the learning diaries of all the students of the study module (N=63) we chose the more exact examination such as adult students' learning diaries, who in their diaries told about their very limited experience and knowledge of writing a scientific theses (N=41). In the learning diary both the thoughts on scientific contents of the study module as well as the personal considerations concerning learning and relationship to science are combined. The learning diary text served both as the assignment of the study module to be assessed and as a tool for the student's self-assessment.

3.3 Analysis

The method of analysis of the material is a inductive content analysis. In the content analysis the researcher triangulation was utilized. The dialogical analysis and the discussions of the two researcher-teachers who had taught the study module in question diversified and strengthened the hermeneutic understanding and interpretation process of the subject in carrying out the content analysis. The material was interpreted from the point of view of study questions by classifying the significant contents, in other words, the personal positioning of the scientificity and connections of contents.

4. RESULTS

4.1 The adult student's personal positioning to scientific knowledge and to research

The first task in the learning diary brought out the students' own positioning in relation to scientificity and to scientific knowledge. In the analysis process five different positionings and relationships of importance in relation to science and scientificity of the adult students' were formed: outsider, superficial, timid, critical realist and user of the expert knowledge, these are examined in more detail in the following subsections.

4.1.1 Relating to science as an outsider

The adult students who regard themselves as outsiders to the science (N: 7) and to making science position themselves far from the science. Science and scientific operation, especially the qualitative study raised critical thoughts also in these students. The students didn't have a personal relationship to science and to scientific operation or the relationship was very brittle. On the other hand, a small number of the students told that they had carried out a small-scale "research" by themselves in their earlier vocational studies, however, it wasn't the case of the actual research in an academic sense.

The students relating as outsiders to science and scientificity knew how to use the basic terminology which is related to the research processes but they mainly presented opinions. The language used was ordinary, shaped as recall or wonder. The students thought about the research operation on the basis of their own criteria and by simplifying. The adult students who had defined themselves as outsiders were aware of their own attitudes, which is positive from the point of view of the progress of the learning process. Critical attitude and relating as an outsider did not form into a negative or down-playing attitude but instead into a challenging personal starting point in regards to the learning process.

Some of the students who defined themselves as outsiders in relation to science did not present a personal relationship to science at all in their learning diaries but they described general significances in connection to scientificity.

"It is important to do research. It usually gives reliable information about a matter because there are certain criteria on how research has to be carried out. The research studies are usually controlled by a body. Research provides such information that otherwise would not necessarily be obtained."

As their objective for the study module the students determined the analysis of the basic stages of the research process and becoming acquainted with carrying out a research study. At times an image was created of passing the studies and of the instrumental value of the contents to be studied based on the students' thoughts. The contentual significance of learning from the point of view of broadening one's own understanding was not conveyed.

4.1.2 Relating superficially to science

A superficial attitude to research activities and to scientific knowledge also prevailed (N: 3). These students defined research activity as close operation for themselves, as easy to approach and to execute. According to them, nowadays there is so much research available that every one can find an interesting research for themselves or can create such research. In an academic sense these students did not have experience of the scientific research process, but their experiences were based on the dissertations in vocational studies. The stages of the process of the scientific operation and the central concepts were tentatively and selectively structured for the students having a superficial relationship to science.

"Scientific research is, in my opinion, a matter which is based on some information that has already been researched earlier. Furthermore, there is the person's own interest in the matter which they want to clarify, for example, with questionnaires, interviews, observations etc. The researcher finds out about the matters that other people have researched earlier. The purpose of the study in my opinion is to prove the right and wrong of something, and to prove something to be true".

Research was defined as human operation which is a part of the ordinary everyday life. The students relating superficially to science determined science useful because it would give useful hints for everyday life and would save time. However, according to the students who related to science superficially, all research information was not thought to be good for everybody because "ignorance is bliss".

The students' attitude was mainly emotional excitement and partly professional reinforcement. The critical attitude to the processes of making science was minor or non-existent. Also the critical examination of one's own knowledge relating to research was minor, and one's own positioning to science and to carrying

out research was light, even arrogant. The language used was in places over-complex and unclear which for its part portrayes the superficial level of understanding of the contents. At the first stage of the studies the reflection on one's own knowledge and new learning was minor.

4.1.3 Relating timidly to science

Some of the students related timidly to scientificity and the work in the field of science (N: 5). They stated repeatedly how research was difficult and distant and the concepts difficult to understand. They presented strong simplifications of what research is and what it is not. Research was organized in their perceptions to be a bunch of rules and instructions to be followed.

"The feeling was at first a little uncertain. The book was extremely difficult to read, in my opinion, containing many difficult words and concepts. Sometimes it seemed that even quite simple matters had been written in a seriously difficult to understand form. I had to "translate Finnish language" into Finnish for myself."

The adult students who related timidly to the science had "bumped" into the research results in connection with their studies or in the Internet. Some were wondering, how elements relating to research could be connected in everyday work and can a person with academic education be competent enough in their work without the knowledge and skills relating to research. In addition to timid, the general positioning to science and the processes relating to research was both respectful and sceptical. Earlier, the attitude had still been more strictly doubtful towards science and the orientation to research had even raised irritation. On the other hand, research and the researchers also inspired respect.

According to these adult students, there was a need for scientific knowledge in a developing society but they did not justify this in more detail. Their relationship to the scientific processes was complicated and unclear, and with the limited understanding, the emotional reaction was pronouncedly fearful. The more exact analysis of the research orientation was not achieved in the learning diary because the examination fluctuated in attempting to define general research regulation and in contemplation of their own emotional and inadequate knowledge.

"This subject seems chaotic, difficult to determine and vague. I can't get a hold on anything. I looked at the assignments and even don't even know what I don't know. I cannot ask when I don't know what I don't know."

The students who related timidly to the processes of science told their own objectives to be low at the beginning of the study module, the objective was to pass the course.

4.1.4 Relating critically to science

Critical realists (N: 21) position themselves realistically in relation to scientific information and processes of carrying out scientific work. They were aware of having the command of the basics but they still had a great deal to learn. The concepts which are related to research were used with caution and uncertainty and they wanted to learn them better. Students realistically realized their own knowledge and skill levels.

It was the critical realist's central objective to learn more of the research process, to understand its significance and to know how to use the relevant concepts. The knowledge of research methods was also evaluated as an instrumental value: one would proceed in the studies though learning the research methods, for example, one could prepare and gain the concrete skills for the Bachelor's thesis. At the same time, the students told about everyday challenges of time management and that everything would not be be learned during the study module anyway. The science relationship of these students had earlier been terrified, critical and skeptical, but studying the subject with the other students and the positive feedback had made their attitudes towards their own knowledge and skills more trusting.

"I am already eagerly expecting my own Bachelor's thesis where I am able for the first time to research a matter that interests me. However, I have noticed that the scientific research is an exact job, many different matters must be taken into consideration. I expect that I will learn the characteristics of the qualitative study and the basic principles of the progress of the research process. My learning motivation is at its top because the study module prepares me for carrying out my own study. I hope that when this course ends, I will have such knowledge and skills that I would know how to conduct a qualitative study by myself.."

The critical realist's attitude to scientific knowledge was partly critical and relative, partly also emotional and was based on early images. Research was not defined as difficult but challenging and interesting. The choices which are part of the research process were evaluated through their own starting points, not from the

point of view of the phenomenon to be examined. The considerations on scientificity processed research choices suitable for oneself, an individual way to operate as well as the familiar concrete stages of carrying out research. The language used was simplified and based partly on opinions. In considering the own relationship to science the emotional approach and the features of the scientific process were present simultaneously and alternately. Students' own objectives with respect to the contents of the study module were presented with care.

4.1.5 Utilizing scientific knowledge as experts

Some of the adult students of the study module (N: 5) told that they were using the information produced by the experts in their work or they were participating in the development projects relating to research even though they were not conducting actual research as their work. They had practical everyday understanding of the progress of the research process: interviews, acquisition of the project funding and the stages of development projects. The everyday experience and scientificity were seen as strengthening each other and their relationship as dialogic.

"I had years of fruitful educational cooperation with my researcher colleague. We obtained the explanation for many practical phenomena which I had perceived already for years without, however, knowing why this happens. It has been interesting to see in these research projects how the practical everyday knowledge transforms into research knowledge which is scientifically proven. It has also gone differently at times and the everyday knowledge was overturned to be the wrong belief, which has also been a significant matter from the point of view of the learning."

" I have worked for my whole adult life with different project funding for my whole adulthood and have participated in different development projects. Only afterwards as have I learned more about the research methods I have been able to name clear stages and methods in the processes."

The users of the expert knowledge expected that their understanding relating to research would continue increasing further. They described significant learning experiences which they had acquired during the study module, even though the research elements of the work context had already existed for years. According to the students' experience the studies and the work together had made the forming of a deeper understanding possible: the research elements they had met in practice received a name and a meaning in the methodology studies and, on the other hand, the contents to be studied were meaningful from the start and they could be practically perceived. The research orientation was familiar to them and part of the everyday development work. These adult students positioned themselves as a part of scientific practices and processes. They trusted their own skills realistically and wanted to be involved in research operation.

4.2 As novice on the fringes of the academic community

The adults novice students' position on the fringes of the academic community of practice and their relationship to academic knowledge and practices that are constructed during the studies of the open university can be understood and conceptualized from the starting points of the situated learning theory (Lave & Wenger 1991). The results that have been described above show that for the student's who position themselves as the users of the scientific knowledge, the expert identity makes it possible already for some of the adult students to have a deeper involvement than others in the practices and policies of the academic community. The students who were critical users of the expert knowledge and who described their relationship to science realistically showed stronger meta-consciousness in regard to their own relationship to science and their thinking than the other students. The transition to the circle of academic education in the open university for the first time can in turn create pressure and negative feelings for some of the adult students in regard to academic identity, own situation in life and connecting it with the studies (Askham 2008; O'Donnel & Tobbel 2007). However, the majority of the adult students positioned themselves realistically and critically to science and its knowledge practices. This positioning was based on their confidence in their own learning and their belief on the gradual construction of the personal relationship to science which will take place in the future.

In the open university, sharing the culture of the academic scientificity and the web-based participation in the independent distance learning are problematical from the starting points of adults' different everyday contexts. The experience of the personal involvement in the processes of the science is, however, one of the central objectives of studies. It is important to support the finding of connections between scientific

knowledge and knowledge practices and of one's own personal life circle in web-based academic adult education (Isosomppi & Maunula 2014; Maunula & Isosomppi 2015.)

5. CONCLUSIONS

The different science relationships and positionings which have been organized in the analysis process of learning diaries are important information for planning the teaching and for the wholeness of pedagogical solutions. Adult students benefit from the versatile support in web-based studies (also Ke & Xie 2009; Ke 2010). By paying attention to the different starting points and needs, cognitive and social support as well as adaptive tools can be offered.

Participation in online interaction should be encouraged and supported. The construction of a personal relationship to science requires socio-cultural knowledge about web-based academic community and its practices and language (Eraut 2004; Tynjälä 2008). Teacher presence in an online course in this sense is important in the construction of the web-based learning community (Garrison & Cleveland-Innes 2005). Participation in the web-based learning community would be particularly important for the students who feel like outsiders or are timid in relation to science. At its best, the interaction supports the adoption of reflective thinking and makes it possible to deal with the feelings and thoughts raised by the studies in a socially safe atmosphere.

The balance between structuredness and interactivity in online course design needs to be considered. An online course design model should involve online interaction but simultaneously support adult students studying in both online and offline learning settings (Ke & Xie 2009). The interaction is often minor in the web-based academic adult education, as it was also in the methodology course which is the context of this study. One can indeed ponder to what extent minor interaction, and the learning diary which has encouraged personal reflection, direct the students to write their own considerations making them visible in the learning diary. Do the discussions of traditional lectures transfer to the learning diaries and does the quiet reflection make it also possible for the more uncertain students to venture into the written presentation of their thoughts? Different e-pedagogical solutions have clear strengths and weaknesses.

However, it is important to offer different ways to encourage adult students for the meta-cognitive processes and for the active construction of personal relationship to science. The different web-based cognitive tools and adaptive learning systems could be an advantage in this (Jonassen 2014; Tsai 2004; Tseng et al. 2008). The reflection on personally and individually developing knowledge and skills is central in order for the profound learning and the attachment of the learned content to the authentic contexts to take place (also Ke & Xie 2009). In the near future just the adaptive web-based tools could help to recognise the levels of knowledge and skills, the strengths and weaknesses even more strongly and offer individually meaningful inputs.

In order for the personal relationship to scientific knowledge to deepen, the profound personal considerations must genuinely be given room for and there needs to be a meaningful context during the web-based course. This is made possible when the adult students are provided opportunities to connect and to actively utilize the knowledge capital they have already acquired as well as their own meta-cognitive processes and contents to be studied (Hofer 2004; Malinen 2000). The individual participation and meaningfulness can be carried out by emphasizing the content reference of the material to be studied. The subjectivity of the material to be studied, the meaningfulness of the tasks and the applicability of the contents to be learned are the central e-pedagogical principles in this process. E-pedagogical solutions direct the students to operate online and in addition to this, the freedom and the wholeness of the learning process need to be remembered: learning takes place on several levels regardless of time and place. The construction of the personal relationship to science is not limited to the web-based environment or to the study module about the subject.

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