A RESEARCH METHODOLOGICAL STUDY OF CONCEPT MAPPING TO FOSTER SHARED UNDERSTANDING TO PROMOTE SUSTAINABLE DEVELOPMENT IN THE UNU-IAS RCE ESPOO, FINLAND

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Abstract. When interview transcripts or other texts are transformed into concept maps, the results will vary. In this study we'll make a small experiment using a novice concept mapper and an expert concept mapper to map the same interview transcripts. The intent of the novice concept mapper is to use concept mapping as a research method in his doctoral dissertation on and for the UNU-IAS RCE Espoo. A RCE (Regional Center of Expertise) is a network of existing formal, non-formal and informal education organizations, to deliver Education for Sustainable Development (ESD) to local and regional communities. RCEs aspire to achieve the goals of the UN Decade of Education for Sustainable Development (UN DESD 2005-2014). A purposeful sample of stakeholders, partners and supporters of the UNU-IAS RCE Espoo were interviewed (N=27). The interviews were analyzed using concept mapping data analysis. This paper focuses on the concept mapping data analysis of the Director General of The Finnish National Board of Education and represents his understanding of concept of sustainable development and ESD. This is an example how concept mapping is used as a research method to promote shared understanding and learning for sustainable development. We are experimenting how concept maps of a novice concept mapper differs from concept maps of an expert concept mapper, when the same transcript of an interview is used as a source text. Åhlberg's (1991, 1993) theory of concept mapping as a general research method for revealing structure of a prose text is used. Results will be discussed from the viewpoint of ESD.

1   Introduction

According to the United Nations University, Institute of Advance studies (UNU-IAS, 2012), Regional Centres of Expertise (RCEs) "bring together institutions at the regional/local level to jointly promote ESD. They build innovative platforms to share information and experiences and to promote dialogue among regional/local stakeholders through partnerships for sustainable development. They create a local/regional knowledge base to support ESD actors, and promote four major goals of ESD in a resource-effective manner…" RCE Espoo is one of the 101 accepted RCEs around the world. Our paper deals with UNU-IAS RCE Espoo, in particularly, how concept mapping can be used as a research method to promote shared understanding and learning for sustainable development. Earlier, concept mapping for sustainable development has been researched by Åhlberg (1993, 2004a and 2005). Concept mapping as a research method has been thoroughly discussed in Wheeldon & Åhlberg (2012). We have not found earlier research in which novices and experts in concept mapping would have constructed concept maps from the same text. We used keywords 'concept map novice expert'. Expertise is focused on special area or field of human culture. To become an expert in any area requires about ten years of purposeful inquiry and practice. An expert has "has stored experience of the actual outcomes of tens of thousands of situations" (Charness, N. & al. (Eds.) (2006) and Dreyfus, H.; Dreyfus, S. (2005)). Åhlberg's research from 1989 has been focused on research use of concept mapping. He has used, researched and developed different versions of Novakian concept mapping for different purposes over decades, tens of thousands of times. He has published both nationally and internationally on the subject. Mr. Jani Siirilä, as his doctoral student has started use of concept mapping in the year 2012. In this sense he is a novice on concept mapping.

1.1   Research Questions

1.   What is the structure and content of two basic concepts of SD and ESD as revealed by an interview of the Director General of The Finnish National Board of Education?
2.   How do concept maps of a novice concept mapper differ from an expert concept mapper in this comparison?

2   Method: Using concept mapping in data analysis to promote shared understanding for ESD

2.1   Sampling, data and concept mapping as a research method

A purposeful sample of stakeholders, partners and supporters of UNU-IAS RCE Espoo were interviewed (N=26). The interviews were analyzed using concept mapping data analysis (Åhlberg 1991, 1993, 2004, 2005 and Wheeldon & Åhlberg 2012). This paper focuses on the concept mapping data analysis of the Director General of The Finnish National Board of Education. We present excerpts from transcription of the interview.

The novice concept mapper (Jani Siirilä, a doctoral student) and an expert concept mapper (Prof. Mauri Åhlberg) transformed the same texts into concept maps. We will compare the original translated, and slightly edited transcripts, and the three concept maps. Transforming free oral language to written language demands a little bit editing. When people are thinking and speaking at the same time, they are seeking for words how to best express their thoughts. We have presented our interpretation what the interviewee tried to express in the transcript. We are using the interviewee's own words as accurately as possible. The method we used was presented originally by Åhlberg (1991 and 1993), developed on the work of Novak (1981) and Novak & Gowin (1984).

2.2   Relevance, validity and reliability of the research and its conclusions

The data is very valuable and relevant, because it is from the person who was one of the originators of UNU-IAS RCE Espoo and nowadays the Director General of the National Board of Education. Validity and reliability of concept mapping has many aspects (Åhlberg 1991, 1993, Wheeldon & Åhlberg, 2012). One aspect of validation is auditing: comparing the original text and the concept map, checking the concept map concept by concept, proposition by proposition. The expert's concept maps have more validity, when audited proposition bay proposition, concept by concept. The other form of concept mapping validation is social validation: showing the concept maps to the interviewee and asking him to check whether they correspond his thinking. By doing this way concept maps can be amended until the interviewee is satisfied with the resulting concept map. The social validation will be done later on. Methodologically, the results can be generalized to other similar situations, in which oral or written text is to be transformed into one or more concept maps. Again, concept mapping showed its power in revealing propositional and concept structure of the interviewee.

2.3   Data

The first excerpt from the interview the Director General of the National Board of Education, an answer to the question focused on how the interviewee understands concept of sustainable development and from the three aspects of sustainable development (ecologic, economic and social) its ecological dimension: "I understand sustainable development as a value. A value for me is a guiding principle for action, a way of thinking. We ought to think always what are the consequences of what we do, and what would be a sustainable way of acting. It means that we do not destroy nature, people or society. We ought to make decisions based on ethical thinking. The Earth has limits. Natural resources are limited. Ecosystems are vulnerable. If natural resources are used too much, they will diminish and end. Fishing is an example. The seas have been fished too much and fish catches are diminishing. In mining, amount of many useful minerals has been declined. I am an expert in history, and I have many examples how cultures have been destroyed, when they have not lived sustainably. In these cases, the whole landscapes have been transformed. Ancient Greece is a typical example. Its forests were felled, and the whole country became transformed. In US Midwest, land was farmed unsustainably, as a result the top soil was literally blown away by winds, this led to surge of refugees. I mean, I'm proceeding on the supposition that we do not waste natural resources, rather that we should live in a way that our footprint of coal and those that are identical are as small as possible. I mean, that natural resources ought to be used sustainably. Small is beautiful in this sense."

The second excerpt from the interview the Director General of the National Board of Education, an answer to the question focused on how the interviewee understands concept of Education for Sustainable Development (ESD): "(1) In ESD thinking, thinking skills, sense of community etc. will be promoted. (2) Pupils will learn to create, learning by doing, integrating ideas broadly. (3) ESD is focused on creation of a worldview, integration of personality, and creating sufficient capabilities, in order that pupils will become able to flourish in this world. (4) ESD is not rote learning, and is not learning those kinds of contents that do not have any practical value, learning those kinds of contents that do not have any practical value. (5) This is the way, how sustainable development becomes a value, that influences the whole societal change via behavior of individuals." Numbering statements from (1) – (5) is done in order to show, how a concept map can be created that follows the original text as closely as possible.

3   Results

3.1   Understanding the concept of sustainable development

Based on the interview transcript excerpt #1, concept maps created by a novice and an expert concept mapper are represented in Figures 1 and 2. The two concept maps differ in, how detailed the understanding of

sustainable development is presented in concept maps. The novice aims for comprehensive view in his concept map analysis. Number of concepts and propositions is very different in these two concept maps. The novice concept mapper summarizes the central aspects for ecological sustainable development into two main points: "sustainable use of natural resources" and "small footprint of coal".   Expert concept mapper follows the text more detailed proposition by proposition, concept by concept. The expert in this case, aims for accurate presentation of interviewee's concepts and propositions.

3.2   Understanding the concept of education for sustainable development

Based on the interview transcript excerpt #2, concept maps created by a novice and an expert concept mapper are presented in Figures 3 and 4. The two concept maps differ in relation to how accurately they follow the original text. The novice aims for comprehensive view in his concept map analysis. The expert's concept maps follows accurately the original text proposition by proposition, concept by concept. The novice uses 13 concepts and the expert 16 concepts. All concepts used by the novice and the expert can be found in the original transcript. The experts created the second, more articulated version of the interview transcript excerpt #2, that is presented in Figure 5.
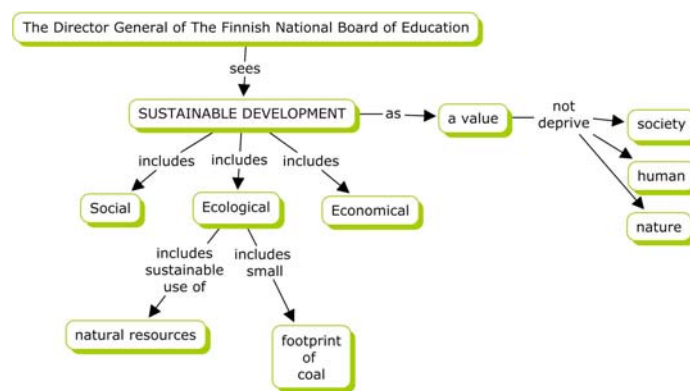

Figure 1. A concept map of the concept of ESD, created by a novice concept mapper from the interview transcript.
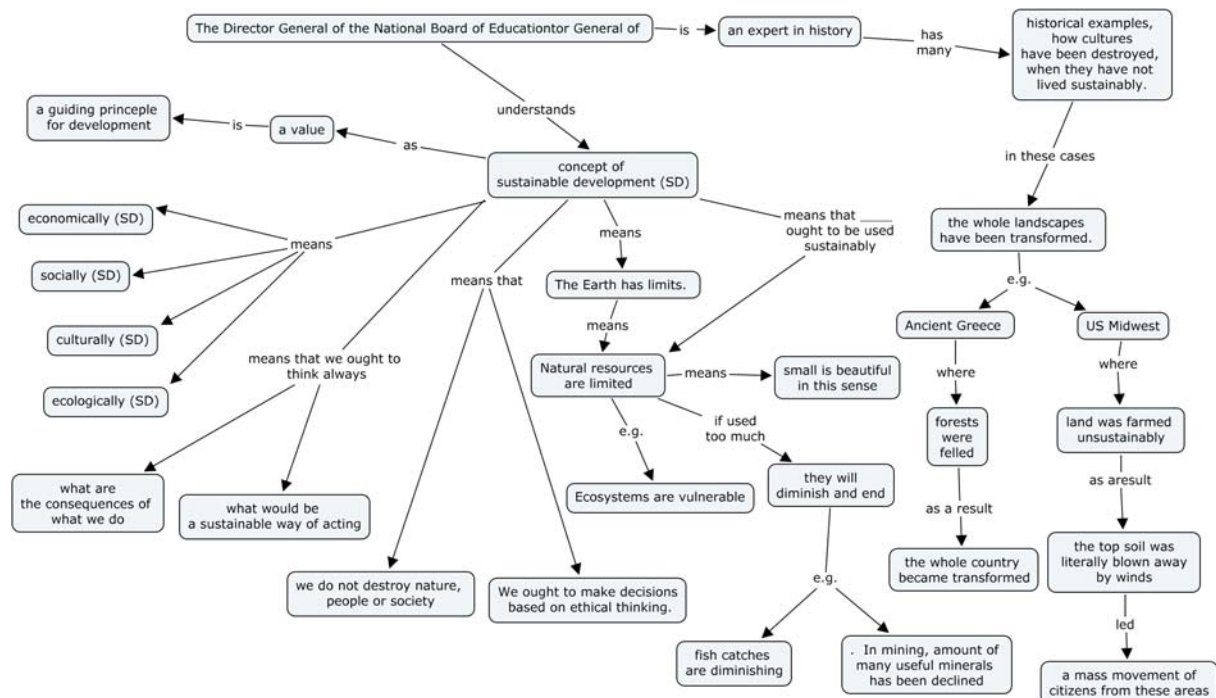

Figure 2. A concept map of the concept of ESD, created by an expert concept mapper from the interview transcript.
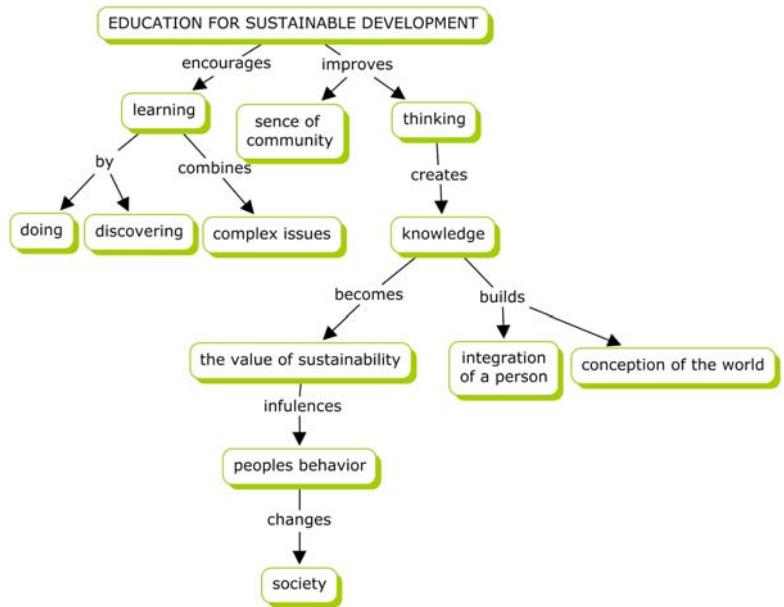
Figure 3. A concept map of the concept of ESD, created by a novice concept mapper from the interview transcript.
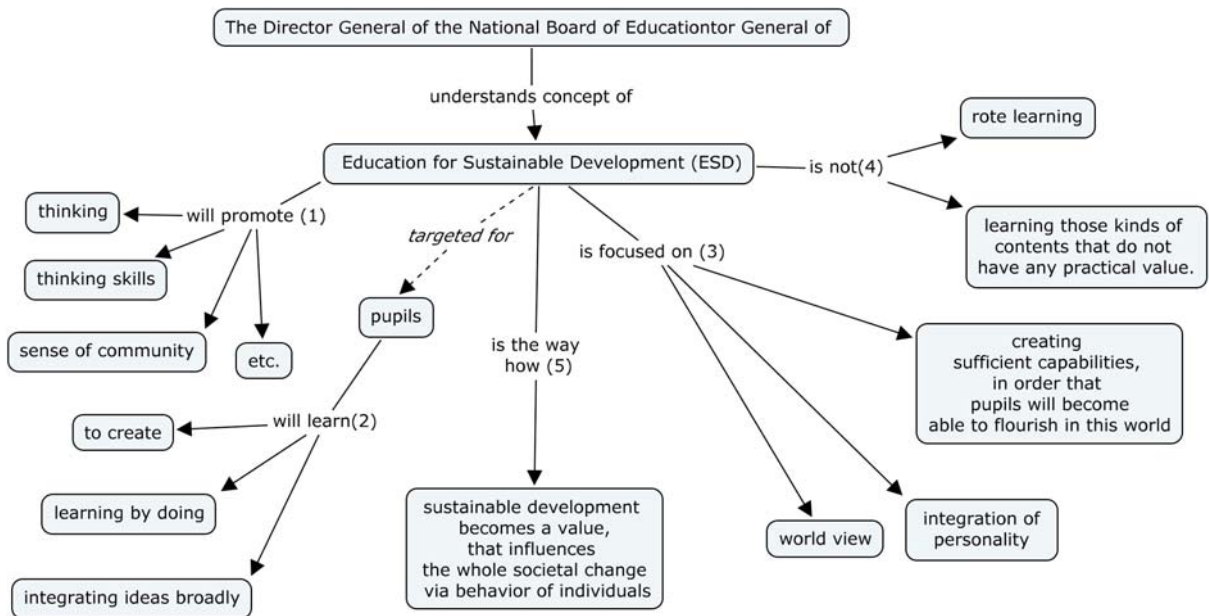

Figure 4. A concept map of the concept of ESD, created by an expert concept mapper from the interview transcript. The first version.
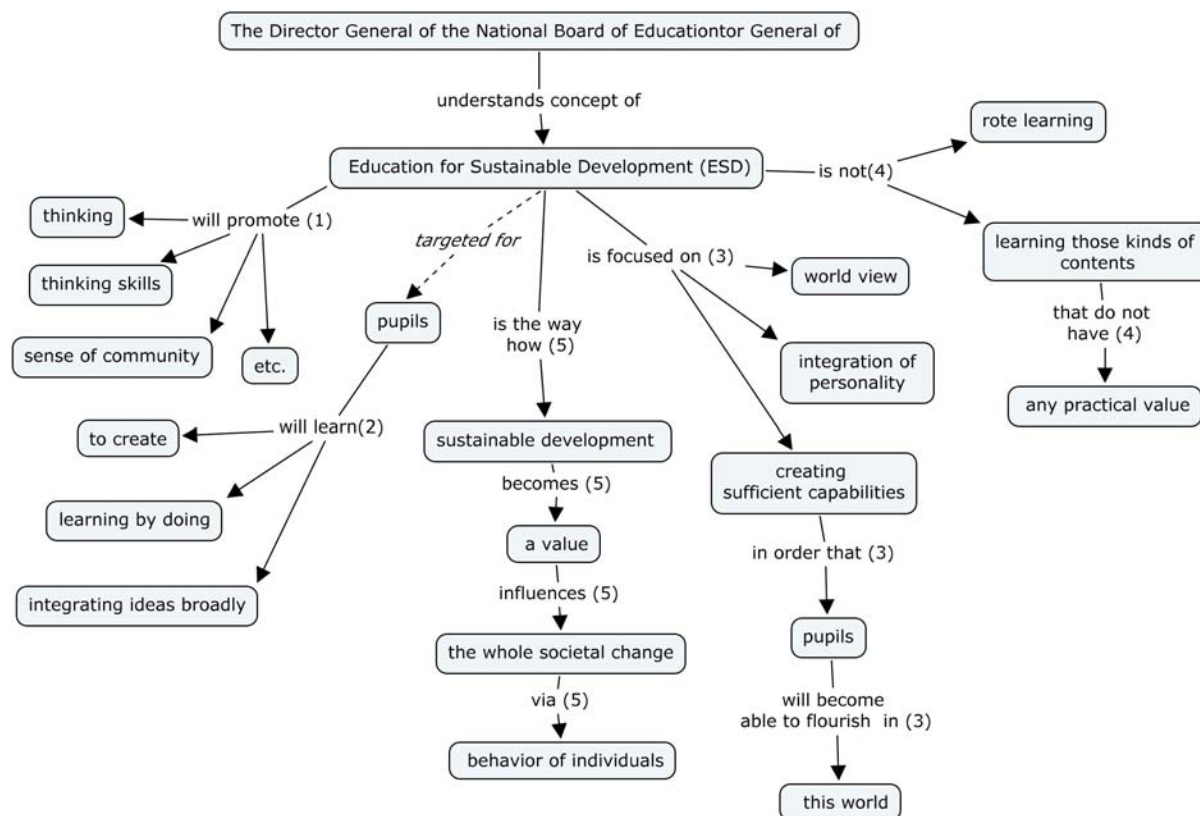
Figure 5. A concept map of the concept of ESD, created by an expert concept mapper from the interview transcript. The second version.

4   Results and discussion

Qualitatively concept maps differ in many ways. The impression is that the two concept maps of the novice are clearly smaller than the concept maps created by the expert. The detailed qualitative analysis reveals that in our case study, the novice uses concept mapping method as described in Novak & Gowin (1984). The linking words are very short, but still they can be found in the original text. The novice aims for comprehensive view via more holistic approach in his concept map analysis. The concept maps created by the expert use flexible improved concept mapping method developed by Åhlberg (1991 – 2004b). The linking phrases can be as long as needed. The label for concept can be as long as needed. Equivalent to concepts in a concept map, also other undivided mental contents can be used inside concept boxes, such as 'the top soil was literally blown away by winds' and 'fish catches are diminishing'. The main point is to search for as good correspondence between the thinking, thoughts, ideas, content of oral or written words, as possible.

Because the original interview was in Finnish and both of us translated it independently, we came a little bit different translations. The expert has studied psychology in Helsinki University, and he translated "persoonan eheytyminen" into a psychological term "integration of personality". The novice has studied sociology, and he translated the same Finnish words into "integration of a person". After checking from the transcript, what the interviewee means, the expert changed his mind: 'Integrating of person' is a better translation to English. The expert remembered also how Jarvis (2006, 32 -49) in his adult learning theory book highlighted the idea: "It is the whole person who learns". The other interesting dialogue between the novice and the expert was created by the Finnish expression "käsitys maailmasta". The novice translated it into 'conception of the world'. The expert first thought that expression of 'world view' might be the best translation, because there is psychological article of importance of worldviews (Koltko-Rivera 2004). For sure there is also Piaget's (1960) book that is translated into English titled 'The Child's Conception of the World'. After truth seeking dialogue, the expert admitted that from the two possible translations, they discussed, the novice's conception of the world' was the best choice. It came into the expert's mind that the famous Finnish philosopher Eino Kaila (1929) published a book 'Nykyinen maailmankäsitys', which translates into 'The Modern Conception of the World'. It is a better choice than "world picture" that as often used in 20th century.

Quality of the concept map	Topic 1: The sum of concepts (k)	Topic 2: The sum of propositions (p)	Topic 3: DIFFERENCE (k) – (p)
Novice (N1), the 1st	11	9	2
Expert (E1), the 1st	29	29	0
DIFFERENCE (E1 –N1)	18	20	

Table 1: Quantitative differences between the novice's and the expert's first concept maps

Interpretation of the Table 1: The expert uses much more concepts and propositions than the novice. The expert tries to catch as accurately as possible the wording, conceptual and propositional structure of the interviewee's as possible.

Quality of the concept map	Topic 1: The sum of concepts (k)	Topic 2: The sum of propositions (p)	Topic 3: DIFFERENCE (k) – (p)
Novice (N2), the 2nd	13	12	1
Expert (E2), the 2nd	16	14	2
DIFFERENCE (E2 – N2)	3	2	

Table 2: Quantitative differences between the novice's and the expert's second concept maps

Interpretation of the Table 2: The expert uses more concepts and propositions than the novice. The expert tries to catch as accurately as possible the wording, conceptual and propositional structure of the interviewee's as possible. This time expert uses many "concepts" that can be interpreted as undivided wholes.

Quality of the concept map	Topic 1: The sum of concepts (k)	Topic 2: The sum of propositions (p)	Topic 3: DIFFERENCE (k) – (p)
Novice (N2), the 2nd	13	12	1
Expert (E2), the 2nd	21	20	1
DIFFERENCE (E2 – N2)	8	8	

Table 3: Quantitative differences between the novice's second concept map and the expert's the second version of second concept map.

Interpretation of the Table 3: The expert uses much more concepts and propositions than the novice. The expert tries to catch as accurately as possible the wording, conceptual and propositional structure of the interviewee's as possible. This time expert divides the "concepts" that were interpreted as undivided wholes in his first version of the interview transcript excerpt #2. In his second version of the second concept maps, he tries to use as basic concepts as possible. The result is very big difference between the novice's and the expert's concept maps.

5   Conclusions

Research on research methodology is useful in the sense, that it can be generalized into all similar analyzes of texts, theoretically/conceptually/analytically as all case studies do (Halkier 2011). Cases are always cases of something. In this paper, cases in interview transcripts, and prose texts in general. Applying (Åhlberg & Ahoranta, 2008) we conclude: Our research data are not random samples, but purposeful samples, which are

information rich (applying Patton1990, 181–185 and Patton 2002, 242). The researched texts are sample of interviewee's thinking and responses (Cook, Leviton & Shadish 1985, 763 – 764; Yin 2009; de Vaus 2002, 148). Purposeful samples of real interviewee excepts allow us to conclude that under the similar conditions, similar phenomena are likely to happen. For sure, each stakeholder is unique in his/her thinking in details, but very probably there are common concepts and common propositions, shared culture. It is the goal of future research to find out what is shared and what is different in each stakeholders thinking, what propositions and work theories are sound, will stand continual theoretical and empirical testing, and which are not, whether there are innovations, that would deserve spreading more broadly etc.

The Director General of the National Board of Education is a learned man. Based on his interview transcripts, and concept maps, created from them, he has sound propositional and conceptual structure of ESD. His ideas provide good starting points for practical actions and continual dialogue for truth and ESD. For sure, he is not an expert in ESD, but he seems to understand many key issues of SD and ESD. It is a good starting point. In future this experiment ought to be replicated using different source texts. Interesting is also to make research on learning from novice to expert in improved concept mapping, in which accurate correspondence between source text/thoughts are sought.

6   References

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