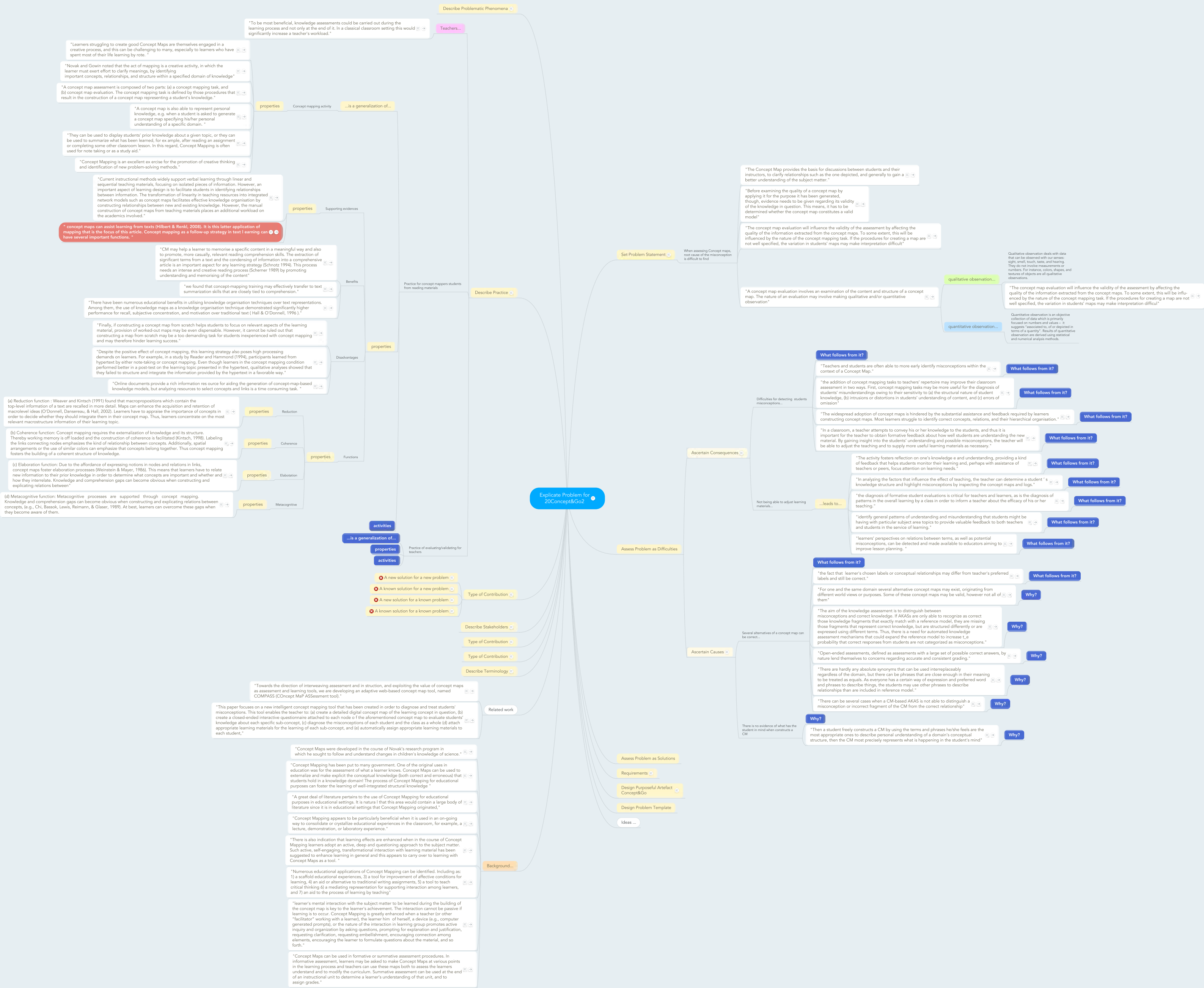

Explicate Problem for 20Concept&Go2
Describe Problematic Phenomena
Teachers...
"To be most beneficial, knowledge assessments could be carried out during the learning process and not only at the end of it. In a classical classroom setting this would significantly increase a teacher's workload."
Describe Practice
Practice for concept mappers students from reading materials
...is a generalization of...
Concept mapping activity
properties
"Learners struggling to create good Concept Maps are themselves engaged in a creative process, and this can be challenging to many, especially to learners who have spent most of their life learning by rote. "
"Novak and Gowin noted that the act of mapping is a creative activity, in which the learner must exert effort to clarify meanings, by identifying important concepts, relationships, and structure within a specified domain of knowledge"
"A concept map assessment is composed of two parts: (a) a concept mapping task, and (b) concept map evaluation. The concept mapping task is defined by those procedures that result in the construction of a concept map representing a student's knowledge."
"A concept map is also able to represent personal knowledge, e.g. when a student is asked to generate a concept map specifying his/her personal understanding of a specific domain. "
"They can be used to display students' prior knowledge about a given topic, or they can be used to summarize what has been learned, for ex ample, after reading an assignment or completing some other classroom lesson. In this regard, Concept Mapping is often used for note taking or as a study aid."
"Concept Mapping is an excellent ex ercise for the promotion of creative thinking and identification of new problem-solving methods."
properties
Supporting evidences
properties
"Current instructional methods widely support verbal learning through linear and sequential teaching materials, focusing on isolated pieces of information. However, an important aspect of learning design is to facilitate students in identifying relationships between information. The transformation of linearity in teaching resources into integrated network models such as concept maps facilitates effective knowledge organisation by constructing relationships between new and existing knowledge. However, the manual construction of concept maps from teaching materials places an additional workload on the academics involved."
" concept maps can assist learning from texts (Hilbert & Renkl, 2008). It is this latter application of mapping that is the focus of this article. Concept mapping as a follow-up strategy in text l earning can have several important functions. "
Benefits
"CM may help a learner to memorise a specific content in a meaningful way and also to promote, more casually, relevant reading comprehension skills. The extraction of significant terms from a text and the condensing of information into a comprehensive article is an important aspect for any learning strategy (Schnotz 1994). This process needs an intense and creative reading process (Scherner 1989) by promoting understanding and memorising of the content"
"we found that concept-mapping training may effectively transfer to text summarization skills that are closely tied to comprehension."
"There have been numerous educational benefits in utilising knowledge organisation techniques over text representations. Among them, the use of knowledge maps as a knowledge organisation technique demonstrated significantly higher performance for recall, subjective concentration, and motivation over traditional text (Hall & O'Donnell, 1996)."
Disadvantages
"Finally, if constructing a concept map from scratch helps students to focus on relevant aspects of the learning material, provision of worked-out maps may be even dispensable. However, it cannot be ruled out that constructing a map from scratch may be a too demanding task for students inexperienced with concept mapping and may therefore hinder learning success."
"Despite the positive effect of concept mapping, this learning strategy also poses high processing demands on learners. For example, in a study by Reader and Hammond (1994), participants learned from hypertext by either note-taking or concept mapping. Even though learners in the concept mapping condition performed better in a post-test on the learning topic presented in the hypertext, qualitative analyses showed that they failed to structure and integrate the information provided by the hypertext in a favorable way."
"Online documents provide a rich information res ource for aiding the generation of concept-map-based knowledge models, but analyzing resources to select concepts and links is a time consuming task. "
Functions
properties
Reduction
(a) Reduction function : Weaver and Kintsch (1991) found that macropropositions which contain the top-level information of a text are recalled in more detail. Maps can enhance the acquisition and retention of macrolevel ideas (O'Donnell, Dansereau, & Hall, 2002). Learners have to appraise the importance of concepts in order to decide whether they should integrate them in their concept map. Thus, learners concentrate on the most relevant macrostructure information of their learning topic.
Coherence
(b) Coherence function: Concept mapping requires the externalization of knowledge and its structure. Thereby working memory is off loaded and the construction of coherence is facilitated (Kintsch, 1998). Labeling the links connecting nodes emphasizes the kind of relationship between concepts. Additionally, spatial arrangements or the use of similar colors can emphasize that concepts belong together. Thus concept mapping fosters the building of a coherent structure of knowledge.
Elabotation
(c) Elaboration function: Due to the affordance of expressing notions in nodes and relations in links, concept maps foster elaboration processes (Weinstein & Mayer, 1986). This means that learners have to relate new information to their prior knowledge in order to determine what concepts are important and whether and how they interrelate. Knowledge and comprehension gaps can become obvious when constructing and explicating relations between"
Metacognitive
(d) Metacognitive function: Metacognitive processes are supported through concept mapping. Knowledge and comprehension gaps can become obvious when constructing and explicating relations between concepts, (e.g., Chi, Bassok, Lewis, Reimann, & Glaser, 1989). At best, learners can overcome these gaps when they become aware of them.
Practice of evaluating/validating for teachers
activities
...is a generalization of...
properties
activities
Type of Contribution
A new solution for a new problem
A known solution for a new problem
A new solution for a known problem
A known solution for a known problem
Describe Stakeholders
Type of Contribution
Type of Contribution
Describe Terminology
Related work
"Towards the direction of interweaving assessment and in struction, and exploiting the value of concept maps as assessment and learning tools, we are developing an adaptive web-based concept map tool, named COMPASS (COncept MaP ASSessment tool)."
"This paper focuses on a new intelligent concept mapping tool that has been created in order to diagnose and treat students' misconceptions. This tool enables the teacher to: (a) create a detailed digital concept map of the learning concept in question, (b) create a closed-ended interactive questionnaire attached to each node o f the aforementioned concept map to evaluate students' knowledge about each specific sub-concept, (c) diagnose the misconceptions of each student and the class as a whole (d) attach appropriate learning materials for the learning of each sub-concept, and (e) automatically assign appropriate learning materials to each student,"
Background...
"Concept Maps were developed in the course of Novak's research program in which he sought to follow and understand changes in children's knowledge of science."
"Concept Mapping has been put to many government. One of the original uses in education was for the assessment of what a learner knows. Concept Maps can be used to externalize and make explicit the conceptual knowledge (both correct and erroneous) that students hold in a knowledge domain! The process of Concept Mapping for educational purposes can foster the learning of well-integrated structural knowledge "
"A great deal of literature pertains to the use of Concept Mapping for educational purposes in educational settings. It is natura l that this area would contain a large body of literature since it is in educational settings that Concept Mapping originated,"
"Concept Mapping appears to be particularly beneficial when it is used in an on-going way to consolidate or crystallize educational experiences in the classroom, for example, a lecture, demonstration, or laboratory experience."
"There is also indication that learning effects are enhanced when in the course of Concept Mapping learners adopt an active, deep and questioning approach to the subject matter. Such active, self-engaging, transformational interaction with learning material has been suggested to enhance learning in general and this appears to carry over to learning with Concept Maps as a tool. "
"Numerous educational applications of Concept Mapping can be identified. Including as: 1) a scaffold educational experiences, 3) a tool for improvement of affective conditions for learning, 4) an aid or alternative to traditional writing assignments, 5) a tool to teach critical thinking 6) a mediating representation for supporting interaction among learners, and 7) an aid to the process of learning by teaching"
"learner's mental interaction with the subject matter to be learned during the building of the concept map is key to the learner's achievement. The interaction cannot be passive if learning is to occur. Concept Mapping is greatly enhanced when a teacher (or other "facilitator" working with a learner), the learner him of herself, a device (e.g., computer generated prompts), or the nature of the interaction in learning group promotes active inquiry and organization by asking questions, prompting for explanation and justification, requesting clarification, requesting embellishment, encouraging connection among elements, encouraging the learner to formulate questions about the material, and so forth."
"Concept Maps can be used in formative or summative assessment procedures. In informative assessment, learners may be asked to make Concept Maps at various points in the learning process and teachers can use these maps both to assess the learners understand and to modify the curriculum. Summative assessment can be used at the end of an instructional unit to determine a learner's understanding of that unit, and to assign grades."
Set Problem Statement
When assessing Concept maps, root cause of the misconception is difficult to find
"The Concept Map provides the basis for discussions between students and their instructors, to clarify relationships such as the one depicted, and generally to gain a better understanding of the subject matter."
"Before examining the quality of a concept map by applying it for the purpose it has been generated, though, evidence needs to be given regarding its validity of the knowledge in question. This means, it has to be determined whether the concept map constitutes a valid model"
"The concept map evaluation will influence the validity of the assessment by affecting the quality of the information extracted from the concept maps. To some extent, this will be influenced by the nature of the concept mapping task. If the procedures for creating a map are not well specified, the variation in students' maps may make interpretation difficult"
"A concept map evaluation involves an examination of the content and structure of a concept map. The nature of an evaluation may involve making qualitative and/or quantitative observation"
qualitative observation...
Qualitative observation deals with data that can be observed with our senses: sight, smell, touch, taste, and hearing. They do not involve measurements or numbers. For instance, colors, shapes, and textures of objects are all qualitative observations.
"The concept map evaluation will influence the validity of the assessment by affecting the quality of the information extracted from the concept maps. To some extent, this will be influ-enced by the nature of the concept mapping task. If the procedures for creating a map are not well specified, the variation in students' maps may make interpretation difficul"
quantitative observation...
Quantitative observation is an objective collection of data which is primarily focused on numbers and values – it suggests "associated to, of or depicted in terms of a quantity". Results of quantitative observation are derived using statistical and numerical analysis methods.
Assess Problem as Difficulties
Ascertain Consequences
Difficulties for detecting students misconceptions...
What follows from it?
"Teachers and students are often able to more early identify misconceptions within the context of a Concept Map."
What follows from it?
"the addition of concept mapping tasks to teachers' repertoire may improve their classroom assessment in two ways. First, concept mapping tasks may be more useful for the diagnosis of students' misunderstandings owing to their sensitivity to (a) the structural nature of student knowledge, (b) intrusions or distortions in students' understanding of content, and (c) errors of omission"
What follows from it?
"The widespread adoption of concept maps is hindered by the substantial assistance and feedback required by learners constructing concept maps. Most learners struggle to identify correct concepts, relations, and their hierarchical organisation."
What follows from it?
"In a classroom, a teacher attempts to convey his or her knowledge to the students, and thus it is important for the teacher to obtain formative feedback about how well students are understanding the new material. By gaining insight into the students' understanding and possible misconceptions, the teacher will be able to adjust the teaching and to supply more useful learning materials as necessary."
What follows from it?
Not being able to adjust learning materials...
...leads to...
"The activity fosters reflection on one's knowledge e and understanding, providing a kind of feedback that helps students monitor their learning and, perhaps with assistance of teachers or peers, focus attention on learning needs."
What follows from it?
"In analyzing the factors that influence the effect of teaching, the teacher can determine a student ' s knowledge structure and highlight misconceptions by inspecting the concept maps and logs."
What follows from it?
"the diagnosis of formative student evaluations is critical for teachers and learners, as is the diagnosis of patterns in the overall learning by a class in order to inform a teacher about the efficacy of his or her teaching."
What follows from it?
"identify general patterns of understanding and misunderstanding that students might be having with particular subject area topics to provide valuable feedback to both teachers and students in the service of learning."
What follows from it?
"learners' perspectives on relations between terms, as well as potential misconceptions, can be detected and made available to educators aiming to improve lesson planning. "
What follows from it?
Ascertain Causes
Several alternatives of a concept map can be correct...
What follows from it?
"the fact that learner's chosen labels or conceptual relationships may differ from teacher's preferred labels and still be correct."
What follows from it?
"For one and the same domain several alternative concept maps may exist, originating from different world views or purposes. Some of these concept maps may be valid, however not all of them"
Why?
"The aim of the knowledge assessment is to distinguish between misconceptions and correct knowledge. If AKASs are only able to recognize as correct those knowledge fragments that exactly match with a reference model, they are missing those fragments that represent correct knowledge, but are structured differently or are expressed using different terms. Thus, there is a need for automated knowledge assessment mechanisms that could expand the reference model to increase t_e probability that correct responses from students are not categorized as misconceptions."
Why?
"Open-ended assessments, defined as assessments with a large set of possible correct answers, by nature lend themselves to concerns regarding accurate and consistent grading."
Why?
"There are hardly any absolute synonyms that can be used interreplaceably regardless of the domain, but there can be phrases that are close enough in their meaning to be treated as equals. As everyone has a certain way of expression and preferred word and phrases to describe things, the students may use other phrases to describe relationships than are included in reference model."
Why?
"There can be several cases when a CM-based AKAS is not able to distinguish a misconception or incorrect fragment of the CM from the correct relationship"
Why?
There is no evidence of what has the student in mind when constructs a CM
Why?
"Then a student freely constructs a CM by using the terms and phrases he/she feels are the most appropriate ones to describe personal understanding of a domain's conceptual structure, then the CM most precisely represents what is happening in the student's mind"
Why?
Assess Problem as Solutions
Requirements
Design Purposeful Artefact Concept&Go
Design Problem Template
Ideas ...

Explicate Problem for 20Concept&Go2

The Explicate Problem activity is about investigating and analysing a practical problem. The problem needs to be precisely formulated and justified by showing that it is significant for some practice. The problem should be of general interest, i.e. significant not only for one local practice but also for some global practice.

1. Set Problem Statement

Record your definition of the problem to be solved here. This should be agreed with other project participants, clearly stated, and as succinct as possible. You should revise this as necessary if it changes over the life of the project - but by adding new/current versions of the definition.

1.1. When assessing Concept maps, root cause of the misconception is difficult to find

1.1.1. "The Concept Map provides the basis for discussions between students and their instructors, to clarify relationships such as the one depicted, and generally to gain a better understanding of the subject matter."

Enlace: https://www.mendeley.com/viewer/?fileId=44a7c65d-7e07-f551-20ed-00327e069c47&documentId=71e81ea0-e531-390c-9e64-b6b08dfec86d#17

A Summary of Literature Pertaining to the Use of Concept Mapping Techniques and Technologies for Education and Performance Support The Chief of Naval Education and Training Pensacola FL 32500

John W Coffey, Mary Jo Carnot, Paul Feltovich, Robert R Hoffman, Joan Feltovich, Joseph D Novak

2003

1.1.2. "Before examining the quality of a concept map by applying it for the purpose it has been generated, though, evidence needs to be given regarding its validity of the knowledge in question. This means, it has to be determined whether the concept map constitutes a valid model"

Enlace: https://www.mendeley.com/viewer/?fileId=7b1ed3d4-4837-797f-37c1-a27479185f73&documentId=f74a517c-fc6c-3ee5-99ca-62d689bed956#3

Representing Domain Knowledge by Concept Maps : How to Validate Them ?

C M Representing Domain, Maps How, Them In, Dietrich Albert, T Honda, F W Hesse, Dietrich Albert, Christina M Steiner

Communication, 2005

1.1.3. "The concept map evaluation will influence the validity of the assessment by affecting the quality of the information extracted from the concept maps. To some extent, this will be influenced by the nature of the concept mapping task. If the procedures for creating a map are not well specified, the variation in students' maps may make interpretation difficult"

Enlace: https://www.mendeley.com/viewer/?fileId=3bed7713-a20b-6fe5-2a69-3853d4585163&documentId=2b0cc2a1-7444-3e5a-83fd-963acd74724a#4

Concept map assessment of classroom learning: Reliability, validity, and logistical practicality

John R. McClure, Brian Sonak, Hoi K. Suen

Journal of Research in Science Teaching, 1999

1.1.4. "A concept map evaluation involves an examination of the content and structure of a concept map. The nature of an evaluation may involve making qualitative and/or quantitative observation"

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John R. McClure, Brian Sonak, Hoi K. Suen

Journal of Research in Science Teaching, 1999

1.1.4.1. qualitative observation...

1.1.4.1.1. Qualitative observation deals with data that can be observed with our senses: sight, smell, touch, taste, and hearing. They do not involve measurements or numbers. For instance, colors, shapes, and textures of objects are all qualitative observations.

1.1.4.1.2. "The concept map evaluation will influence the validity of the assessment by affecting the quality of the information extracted from the concept maps. To some extent, this will be influ- enced by the nature of the concept mapping task. If the procedures for creating a map are not well specified, the variation in students' maps may make interpretation difficul"

Enlace: https://www.mendeley.com/reference-manager/reader/2b0cc2a1-7444-3e5a-83fd-963acd74724a/3bed7713-a20b-6fe5-2a69-3853d4585163#4

Concept map assessment of classroom learning: Reliability, validity, and logistical practicality

John R. McClure, Brian Sonak, Hoi K. Suen

Journal of Research in Science Teaching, 1999

1.1.4.2. quantitative observation...

1.1.4.2.1. Quantitative observation is an objective collection of data which is primarily focused on numbers and values – it suggests "associated to, of or depicted in terms of a quantity". Results of quantitative observation are derived using statistical and numerical analysis methods.

2. Assess Problem as Difficulties

2.1. Ascertain Consequences

To underline the importance of the problem, consequence of NOT addressing it should be highlighted.

2.1.1. Difficulties for detecting students misconceptions...

2.1.1.1. What follows from it?

2.1.1.2. "Teachers and students are often able to more early identify misconceptions within the context of a Concept Map."

Enlace: https://www.mendeley.com/viewer/?fileId=44a7c65d-7e07-f551-20ed-00327e069c47&documentId=71e81ea0-e531-390c-9e64-b6b08dfec86d#23

A Summary of Literature Pertaining to the Use of Concept Mapping Techniques and Technologies for Education and Performance Support The Chief of Naval Education and Training Pensacola FL 32500

John W Coffey, Mary Jo Carnot, Paul Feltovich, Robert R Hoffman, Joan Feltovich, Joseph D Novak

2003

2.1.1.2.1. What follows from it?

2.1.1.3. "the addition of concept mapping tasks to teachers' repertoire may improve their classroom assessment in two ways. First, concept mapping tasks may be more useful for the diagnosis of students' misunderstandings owing to their sensitivity to (a) the structural nature of student knowledge, (b) intrusions or distortions in students' understanding of content, and (c) errors of omission"

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John R. McClure, Brian Sonak, Hoi K. Suen

Journal of Research in Science Teaching, 1999

2.1.1.3.1. What follows from it?

2.1.1.4. "The widespread adoption of concept maps is hindered by the substantial assistance and feedback required by learners constructing concept maps. Most learners struggle to identify correct concepts, relations, and their hierarchical organisation."

Enlace: https://www.mendeley.com/viewer/?fileId=2864c8a9-9328-fff9-0c9c-70dafc4572c7&documentId=6fe56908-f252-37a8-8c7e-cd8ef716eab6#2

A comprehensive text analysis of lecture slides to generate concept maps

Thushari Atapattu, Katrina Falkner, Nickolas Falkner

Computers and Education, 2017

2.1.1.4.1. What follows from it?

2.1.1.5. "In a classroom, a teacher attempts to convey his or her knowledge to the students, and thus it is important for the teacher to obtain formative feedback about how well students are understanding the new material. By gaining insight into the students' understanding and possible misconceptions, the teacher will be able to adjust the teaching and to supply more useful learning materials as necessary."

Enlace: https://www.mendeley.com/viewer/?fileId=66c58fbc-07e9-afc1-1339-e891262210bf&documentId=864f9dfd-e988-36c7-b020-eeea0163d91a#1

Learning and diagnosis of individual and class conceptual perspectives: An intelligent systems approach using clustering techniques

Shein Yung Cheng, Chia Sheng Lin, Hsien Hsun Chen, Jia Sheng Heh

Computers and Education, 2005

2.1.1.5.1. What follows from it?

2.1.2. Not being able to adjust learning materials...

2.1.2.1. ...leads to...

2.1.2.1.1. "The activity fosters reflection on one’s knowledge e and understanding, providing a kind of feedback that helps students monitor their learning and, perhaps with assistance of teachers or peers, focus attention on learning needs."

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2003

2.1.2.1.1.1. What follows from it?

2.1.2.1.2. "In analyzing the factors that influence the effect of teaching, the teacher can determine a student ’ s knowledge structure and highlight misconceptions by inspecting the concept maps and logs."

Enlace: https://www.mendeley.com/viewer/?fileId=3afa7a11-8225-263f-3492-081a09d66637&documentId=3706a704-3d61-3776-aa03-b4cb7dff29b1#1

Using a concept map knowledge management system to enhance the learning of biology

Shih Hwa Liu, Gwo Guang Lee

Computers and Education, 2013

2.1.2.1.2.1. What follows from it?

2.1.2.1.3. "the diagnosis of formative student evaluations is critical for teachers and learners, as is the diagnosis of patterns in the overall learning by a class in order to inform a teacher about the efficacy of his or her teaching."

Enlace: https://www.mendeley.com/viewer/?fileId=66c58fbc-07e9-afc1-1339-e891262210bf&documentId=864f9dfd-e988-36c7-b020-eeea0163d91a#1

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Computers and Education, 2005

2.1.2.1.3.1. What follows from it?

2.1.2.1.4. "identify general patterns of understanding and misunderstanding that students might be having with particular subject area topics to provide valuable feedback to both teachers and students in the service of learning."

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Learning and diagnosis of individual and class conceptual perspectives: An intelligent systems approach using clustering techniques

Shein Yung Cheng, Chia Sheng Lin, Hsien Hsun Chen, Jia Sheng Heh

Computers and Education, 2005

2.1.2.1.4.1. What follows from it?

2.1.2.1.5. "learners’ perspectives on relations between terms, as well as potential misconceptions, can be detected and made available to educators aiming to improve lesson planning. "

Enlace: https://www.mendeley.com/viewer/?fileId=1e1e2ebd-8d8d-39c5-2059-66476ce66763&documentId=fe1838a1-3e5c-34af-a141-d9398e1a4c49#1

Student strategies for categorizing IT-related terms

Torsten Brinda, Stephan Napierala, David Tobinski, Ira Diethelm

Education and Information Technologies, 2019

2.1.2.1.5.1. What follows from it?

2.2. Ascertain Causes

At an early stage, a problem is often formulated in an impressionistic way, mainly
expressing a feeling that some state of affairs is unsatisfactory. However, in order to
do something about the problem, it is not sufficient to stay with such an impressionistic
understanding. A more detailed understanding is required. In order to
arrive at this, a so-called root cause analysis can be performed, in which the
underlying causes are identified, analysed, and represented. By addressing these
causes, better results can be achieved than by treating only the symptoms of the
problem.

2.2.1. Several alternatives of a concept map can be correct...

2.2.1.1. What follows from it?

2.2.1.2. "the fact that learner's chosen labels or conceptual relationships may differ from teacher's preferred labels and still be correct."

Enlace: https://www.mendeley.com/viewer/?fileId=7d26bd6d-b586-c4c1-7504-fb3aa020a663&documentId=f193edb9-2997-3d05-ba0a-c87d397dfbb4#1

Increasing the flexibility of automated concept map based knowledge assessment

Maija Strautmane

ACM International Conference Proceeding Series, 2014

2.2.1.2.1. What follows from it?

2.2.1.3. "For one and the same domain several alternative concept maps may exist, originating from different world views or purposes. Some of these concept maps may be valid, however not all of them"

Enlace: https://www.mendeley.com/viewer/?fileId=7b1ed3d4-4837-797f-37c1-a27479185f73&documentId=f74a517c-fc6c-3ee5-99ca-62d689bed956#2

Representing Domain Knowledge by Concept Maps : How to Validate Them ?

C M Representing Domain, Maps How, Them In, Dietrich Albert, T Honda, F W Hesse, Dietrich Albert, Christina M Steiner

Communication, 2005

2.2.1.3.1. Why?

2.2.1.4. "The aim of the knowledge assessment is to distinguish between misconceptions and correct knowledge. If AKASs are only able to recognize as correct those knowledge fragments that exactly match with a reference model, they are missing those fragments that represent correct knowledge, but are structured differently or are expressed using different terms. Thus, there is a need for automated knowledge assessment mechanisms that could expand the reference model to increase t_e probability that correct responses from students are not categorized as misconceptions."

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2.2.1.4.1. Why?

2.2.1.5. "Open-ended assessments, defined as assessments with a large set of possible correct answers, by nature lend themselves to concerns regarding accurate and consistent grading."

Enlace: https://www.mendeley.com/viewer/?fileId=7c566de2-7fea-cbf5-2705-9b57bf466e6b&documentId=833daa98-5907-3e51-85b9-e203339e644c#1

Establishing open-ended assessments: Investigating the validity of creative exercises

Scott E. Lewis, Janet L. Shaw, Kathryn A. Freeman

Chemistry Education Research and Practice, 2011

2.2.1.5.1. Why?

2.2.1.6. "There are hardly any absolute synonyms that can be used interreplaceably regardless of the domain, but there can be phrases that are close enough in their meaning to be treated as equals. As everyone has a certain way of expression and preferred word and phrases to describe things, the students may use other phrases to describe relationships than are included in reference model."

Enlace: https://www.mendeley.com/viewer/?fileId=7d26bd6d-b586-c4c1-7504-fb3aa020a663&documentId=f193edb9-2997-3d05-ba0a-c87d397dfbb4#4

Increasing the flexibility of automated concept map based knowledge assessment

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ACM International Conference Proceeding Series, 2014

2.2.1.6.1. Why?

2.2.1.7. "There can be several cases when a CM-based AKAS is not able to distinguish a misconception or incorrect fragment of the CM from the correct relationship"

Enlace: https://www.mendeley.com/viewer/?fileId=7d26bd6d-b586-c4c1-7504-fb3aa020a663&documentId=f193edb9-2997-3d05-ba0a-c87d397dfbb4#3

Increasing the flexibility of automated concept map based knowledge assessment

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ACM International Conference Proceeding Series, 2014

2.2.1.7.1. Why?

2.2.2. There is no evidence of what has the student in mind when constructs a CM

2.2.2.1. Why?

2.2.2.2. "Then a student freely constructs a CM by using the terms and phrases he/she feels are the most appropriate ones to describe personal understanding of a domain’s conceptual structure, then the CM most precisely represents what is happening in the student's mind"

Enlace: https://www.mendeley.com/viewer/?fileId=7d26bd6d-b586-c4c1-7504-fb3aa020a663&documentId=f193edb9-2997-3d05-ba0a-c87d397dfbb4#7

Increasing the flexibility of automated concept map based knowledge assessment

Maija Strautmane

ACM International Conference Proceeding Series, 2014

2.2.2.2.1. Why?

3. Assess Problem as Solutions

3.1. Alleviate Consequences

3.1.1. No longer Difficulties for detecting students misconceptions...

Enlace: https://www.mindmeister.com/1692971247

3.1.2. No longer Not being able to adjust learning materials...

Enlace: https://www.mindmeister.com/1692980924

3.1.2.1. ...leads to...

3.1.2.1.1. No longer "In analyzing the factors that influence the effect of teaching, the teacher can determine a student ’ s knowledge structure and highlight misconceptions by inspecting the concept maps and logs."

Enlace: https://www.mindmeister.com/1695459158

3.1.2.1.2. No longer "the diagnosis of formative student evaluations is critical for teachers and learners, as is the diagnosis of patterns in the overall learning by a class in order to inform a teacher about the efficacy of his or her teaching."

Enlace: https://www.mindmeister.com/1693284413

3.1.2.1.3. No longer "learners’ perspectives on relations between terms, as well as potential misconceptions, can be detected and made available to educators aiming to improve lesson planning. "

Enlace: https://www.mindmeister.com/1695459157

3.1.2.1.4. No longer "identify general patterns of understanding and misunderstanding that students might be having with particular subject area topics to provide valuable feedback to both teachers and students in the service of learning."

Enlace: https://www.mindmeister.com/1693326356

3.2. Lessen Causes

3.2.1. No longer Several alternatives of a concept map can be correct...

Enlace: https://www.mindmeister.com/1692964394

3.2.1.1. No longer "Open-ended assessments, defined as assessments with a large set of possible correct answers, by nature lend themselves to concerns regarding accurate and consistent grading."

Enlace: https://www.mindmeister.com/1695459159

3.2.2. No longer There is no evidence of what has the student in mind when constructs a CM

Enlace: https://www.mindmeister.com/1695984871

4. Requirements

What artefact can be a solution for the explicated problem and which requirements
on this artefact are important for the stakeholders? A requirement is a property of an artefact that is deemed as desirable by stakeholders in a practice and that is to be used for guiding the design and development of the artefact. For each requirement, explain why it is needed and
relate it to the problem.

4.1. Functional Requirements

Functional requirements are what the system should do. They include the ways to reduce or alleviate the consequences and causes of the problem. For each functional requirement, answer the "How?" questions to to start the design.

4.2. Non-functional Requirements

Non-functional requirements are not what the purposeful artefact should do, but instead are desirable characteristics that the purposeful artefact should have. These are then additional design goals. A checklist of possible non-functional requirements is provided to the right, grouped into categories. For each non-functional requirement, answer the "How?" questions to to start the design.

4.2.1. Structural

4.2.1.1. Coherence

the degree to which the parts of an artefact are logically, orderly, and consistently related; coherence is low if an artefact includes parts that, in some sense, do not fit in with the rest of the artefact.

4.2.1.2. Consistency

the degree to which a model is free from conflict.

4.2.1.3. Modularity

the degree to which an artefact is divided into components that may be separated and recombined; common requirements related to modularity are low coupling, i.e. modules are not overly related with each other; high cohesion, i.e. modules are highly related internally; and high composability, i.e. modules can be easily replaced and recombined.

4.2.1.4. Conciseness

the absence of redundant components in an artefact, i.e. components the functions of which can be derived from other components.

4.2.2. Usage

4.2.2.1. Usability

the ease with which a user can use an artefact to achieve a particular goal

4.2.2.2. Comprehensibility

the ease with which an artefact can be understood or comprehended by a user (also called understandability)

4.2.2.3. Learnability

the ease with which a user can learn to use an artefact

4.2.2.4. Customisability

the degree to which an artefact can be adapted to the specific needs of a local practice or user

4.2.2.5. Suitability

the degree to which an artefact is tailored to a specific practice, focusing only on its essential aspects (also called inherence or precision)

4.2.2.6. Accessibility

the degree to which an artefact is accessible by as many users as possible

4.2.2.7. Elegance

the degree to which an artefact is pleasing and graceful in appearance or style (also called aesthetics)

4.2.2.8. Fun

the degree to which an artefact is attractive and fun to use

4.2.2.9. Traceability

> the ability to verify the history of using a method by means of documentation

4.2.3. Management

4.2.3.1. Maintainability

> the ease with which an artefact can be maintained in order to correct defects, meet new requirements, make future maintenance easier, or cope with a changed environment.

4.2.3.2. Flexibility

> the ease with which an artefact can be adapted when external changes occur (similar to maintainability; related notions are configurability, evolvability, and extensibility).

4.2.3.3. Accountability

> the ease with which an actor can be made accountable for the workings of an artefact (a similar notion is auditability).

4.2.4. Environmental

4.2.4.1. Expresiveness

> the degree to which a set of constructs or a model is capable of representing the entities of interest in a domain

4.2.4.2. Correctness

the degree to which a model corresponds to the domain it represents (also called accurateness)

4.2.4.3. Generality

the degree to which an artefact is relevant not only for a local but also for a global practice

4.2.4.4. Interoperability

the ability of an artefact to work together with other artefacts, in particular, to exchange data (related notions are openness, compatibility, and compliance with standards)

4.2.4.5. Autonomy

the capacity of an artefact to function without the involvement of another system

4.2.4.6. Proximity

the degree to which independent aspects of a domain are captured by different constructs, and related aspects are represented by related constructs

4.2.4.7. Completeness

the degree to which an artefact includes all components required for addressing the problem for which it has been created

4.2.4.8. Effectiveness

the degree to which an artefact is able to achieve its goals

4.2.4.9. Efficiency

the degree to which an artefact is effective without wasting time, effort, or expense

4.2.4.10. Robustness

the ability of an artefact to withstand environmental change without adapting its construction

4.2.4.11. Resilience

the ability of an artefact to adapt itself when faced with major environmental change (related notions are degradability, survivability, and safety)

5. Design Purposeful Artefact Concept&Go

The Design and Develop Artifact activity creates an artifact that addresses the explicated problem and fulfills the defined requirements. Designing an artifact includes determining its functionality as well as its structure.

5.1. Description

5.2. Technological Platforms

5.3. Requirements

5.4. Components

6. Ideas ...

7. Design Problem Template

7.1. Improve

7.1.1. When assessing Concept maps, root cause of the misconception is difficult to find

Enlace: https://www.mindmeister.com/1689003310

7.2. By

7.3. That satisfies

7.4. In order to help

8. Background...

8.1. "Concept Maps were developed in the course of Novak's research program in which he sought to follow and understand changes in children's knowledge of science."

Enlace: https://www.mendeley.com/viewer/?fileId=44a7c65d-7e07-f551-20ed-00327e069c47&documentId=71e81ea0-e531-390c-9e64-b6b08dfec86d#6

A Summary of Literature Pertaining to the Use of Concept Mapping Techniques and Technologies for Education and Performance Support The Chief of Naval Education and Training Pensacola FL 32500

John W Coffey, Mary Jo Carnot, Paul Feltovich, Robert R Hoffman, Joan Feltovich, Joseph D Novak

2003

8.2. "Concept Mapping has been put to many government. One of the original uses in education was for the assessment of what a learner knows. Concept Maps can be used to externalize and make explicit the conceptual knowledge (both correct and erroneous) that students hold in a knowledge domain! The process of Concept Mapping for educational purposes can foster the learning of well-integrated structural knowledge "

Enlace: https://www.mendeley.com/viewer/?fileId=44a7c65d-7e07-f551-20ed-00327e069c47&documentId=71e81ea0-e531-390c-9e64-b6b08dfec86d#7

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8.3. "A great deal of literature pertains to the use of Concept Mapping for educational purposes in educational settings. It is natura l that this area would contain a large body of literature since it is in educational settings that Concept Mapping originated,"

Enlace: https://www.mendeley.com/viewer/?fileId=44a7c65d-7e07-f551-20ed-00327e069c47&documentId=71e81ea0-e531-390c-9e64-b6b08dfec86d#8

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8.4. "Concept Mapping appears to be particularly beneficial when it is used in an on-going way to consolidate or crystallize educational experiences in the classroom, for example, a lecture, demonstration, or laboratory experience."

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8.5. "There is also indication that learning effects are enhanced when in the course of Concept Mapping learners adopt an active, deep and questioning approach to the subject matter. Such active, self-engaging, transformational interaction with learning material has been suggested to enhance learning in general and this appears to carry over to learning with Concept Maps as a tool. "

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8.6. "Numerous educational applications of Concept Mapping can be identified. Including as: 1) a scaffold educational experiences, 3) a tool for improvement of affective conditions for learning, 4) an aid or alternative to traditional writing assignments, 5) a tool to teach critical thinking 6) a mediating representation for supporting interaction among learners, and 7) an aid to the process of learning by teaching"

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8.7. "learner's mental interaction with the subject matter to be learned during the building of the concept map is key to the learner's achievement. The interaction cannot be passive if learning is to occur. Concept Mapping is greatly enhanced when a teacher (or other “facilitator” working with a learner), the learner him of herself, a device (e.g., computer generated prompts), or the nature of the interaction in learning group promotes active inquiry and organization by asking questions, prompting for explanation and justification, requesting clarification, requesting embellishment, encouraging connection among elements, encouraging the learner to formulate questions about the material, and so forth."

Enlace: https://www.mendeley.com/viewer/?fileId=44a7c65d-7e07-f551-20ed-00327e069c47&documentId=71e81ea0-e531-390c-9e64-b6b08dfec86d#9

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8.8. "Concept Maps can be used in formative or summative assessment procedures. In informative assessment, learners may be asked to make Concept Maps at various points in the learning process and teachers can use these maps both to assess the learners understand and to modify the curriculum. Summative assessment can be used at the end of an instructional unit to determine a learner’s understanding of that unit, and to assign grades."

Enlace: https://www.mendeley.com/viewer/?fileId=44a7c65d-7e07-f551-20ed-00327e069c47&documentId=71e81ea0-e531-390c-9e64-b6b08dfec86d#25

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9. Related work

9.1. "Towards the direction of interweaving assessment and in struction, and exploiting the value of concept maps as assessment and learning tools, we are developing an adaptive web-based concept map tool, named COMPASS (COncept MaP ASSessment tool)."

Enlace: https://www.mendeley.com/viewer/?fileId=0c20c0a2-751a-1475-71a4-1e6e9cd9ebff&documentId=f4ff3bb9-5922-315f-98fa-604de43cc044#1

Compass: An Adaptive Web-Based Concept Map Assessment Tool

Evangelia Gouli, Agoritsa Gogoulou, Kyparisia Papanikolaou, Maria Grigoriadou

Concept Maps: Theory, Methodology, Technology. Proc. of the First Int. Conference on Concept Mapping, 2004

9.2. "This paper focuses on a new intelligent concept mapping

tool that has been created in order to diagnose and treat students' misconceptions. This tool enables the teacher to: (a) create a detailed digital concept map of the learning concept in question, (b) create a closed-ended interactive questionnaire attached to each node o f the aforementioned concept map to evaluate students’ knowledge about each specific sub-concept, (c) diagnose the misconceptions of each student and the class as a whole (d) attach appropriate learning materials for the learning of each sub-concept, and (e) automatically assign appropriate learning materials to each student,"

Enlace: https://www.mendeley.com/viewer/?fileId=1a6d0d3b-f6b7-5ebb-3358-721e34a02077&documentId=2aac2629-046c-3514-905b-3668bde5ce7d#2

Diagnosis and Treatment of Students’ Misconceptions with an Intelligent Concept Mapping Tool

Maria Kordaki, Panagiotis Psomos

Procedia - Social and Behavioral Sciences, 2015

10. Describe Terminology

A good theory precisely defines the theoretical terms, so that a community of scientists can observe and measure them.

11. Type of Contribution

Gregor and Hevner proposed a framework for classifying DSR contributions according to two dimensions: the Solution Maturity and the Application Domain Maturity. The former refers to the maturity of artefacts that can be potential starting points for the solution, while the latter refers to the maturity of the practice.
For more information, refer to Gregor, S. and Hevner, A.: Positioning and Presenting Design Science Research for Maximum Impact. MIS Quarterly (2013)

11.1. A new solution for a new problem

Invention:

This kind of contribution is a radical innovation that addresses an unexplored problem context and offers a novel and unexpected solution. Such a contribution can enable new practices and create the basis for new research fields. Some examples of inventions are the first X-ray machine, the first car, and the first data mining system. Inventions are rare and typically require broad knowledge and hard work as well as ingenuity and a bit of luck in order to occur.

Extracted from: Johannesson, J. and Perjons, E.: An Introduction to Design Science (2014)

11.2. A known solution for a new problem

Exaptation:

This kind of contribution adapts an existing solution to a problem for which it was not originally intended. In other words, an existing artefact is repurposed, or exapted, to a new problem context. For example, the anticoagulant chemical warfarin was introduced as a rat poison but later repurposed as a blood-thinning medicine. Gunpowder started out as a medical elixir in China centuries before it was repurposed for powering fireworks and firearms. Exaptations occur frequently in design science research.

Extracted from: Johannesson, J. and Perjons, E.: An Introduction to Design Science (2014)

11.3. A new solution for a known problem

Improvement:

This kind of contribution addresses a known problem and offers a new solution or a substantial enhancement to an existing one. Improvements may concern efficiency, usability, safety, main- tainability, or other qualities; see Sect. 6.5. Some examples of improvements are the first sport bike, an X-ray machine with substantially reduced radiation, and a data mining system able to handle very large data sets. Improvements are probably the most common kind of design science contribution, and they can be challenging because a researcher needs to show that a proposed solution actually improves on the state of the art.

Extracted from: Johannesson, J. and Perjons, E.: An Introduction to Design Science (2014)

11.4. A known solution for a known problem

Routine Design:

This kind of contribution is an incremental innovation that addresses a well-known problem by making minor modifications to an existing solution. Much of practical professional design would fit into this category, e.g. the design of a new smartphone with slightly better specifications than its predecessor. Routine designs typically do not count as design science contributions because they do not produce new knowledge of general interest, but they can still be valuable design contributions.

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13. Describe Stakeholders

Developed by Werner Ulrich, Critical System Heuristics (CSH) focusses on the boundary or scope of an intervention (e.g. a DSR project) by examining the different interests of four types of stakeholders and ensuring that their interests are supported within the scope of the intervention.

13.1. Add Client(s)

add Clients to the left. Clients are those people or organisations whose needs and interests motivate an intervention (e.g. a DSR project and later use of the purposeful artefact).

13.2. Add Decision Maker(s)

Add decision makers to the left. Decision Makers are people or oganisations who have the power to decide what purpose(s) that an intervention will serve or whether an intervention will proceed or not, typically through control of resources needed for the intervention (e.g. funding, permissions, access, etc.).

13.3. Add Professional(s)

Add Professionals to the left. Professionals are people who provide expertise and who undertake the work of managing and enacting an intervention. In a DSR project, this will include the researchers and other involved personnel, e.g. those implementing a developed purposeful artefact.

13.4. Add Witness(es)

Add Witnesses to the left. Witnesses are people or organisations who are affected by, but not directly involved in the purposeful artefact development and its eventual implementation and use. Their interests should be considered (and protected) so they are not disadvantaged.

14. Type of Contribution

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15. Describe Problematic Phenomena

In the early stages of a research program, we usually need to ask exploratory questions, as we attempt to understand the phenomena, and identify useful distinctions that clarify our understanding. These Knowledge Questions are adapted from Easterbrook (2008) which are in turn adapted from those in Meltzoff (1998)

15.1. Descriptive Questions

15.1.1. What is "When assessing Concept maps, root cause of the misconception is difficult to find" like?

15.1.2. What are its properties?

15.1.3. How can it be categorized?

15.1.4. How can we measure it?

15.1.5. What is its purpose?

15.1.6. What are its components?

15.1.7. How do the components relate to one another?

15.1.8. What are all the types of "When assessing Concept maps, root cause of the misconception is difficult to find"?

15.1.9. How does "When assessing Concept maps, root cause of the misconception is difficult to find" differ from similar problems?

15.2. Occurrence Questions

15.2.1. How often does "When assessing Concept maps, root cause of the misconception is difficult to find" occur?

15.2.2. What is an average amount of "When assessing Concept maps, root cause of the misconception is difficult to find"?

15.2.3. How does "When assessing Concept maps, root cause of the misconception is difficult to find" normally work?

15.2.4. What is the process by which "When assessing Concept maps, root cause of the misconception is difficult to find" happens?

15.2.5. In what sequence do the events of "When assessing Concept maps, root cause of the misconception is difficult to find" occur?

15.2.6. What are the steps "When assessing Concept maps, root cause of the misconception is difficult to find" goes through as it evolves?

16. Describe Practice

A practice is a set of human activities performed regularly and seen as meaningfully
related to each other by the people participating in them. Broadly, it is the setting in which the problem arises.

Please record a description of the practices you wish to support, preferably supported by evidence from extant publications.

16.1. Teachers...

16.1.1. "To be most beneficial, knowledge assessments could be carried out during the learning process and not only at the end of it. In a classical classroom setting this would significantly increase a teacher's workload."

Enlace: https://www.mendeley.com/viewer/?fileId=7d26bd6d-b586-c4c1-7504-fb3aa020a663&documentId=f193edb9-2997-3d05-ba0a-c87d397dfbb4#1

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Maija Strautmane

ACM International Conference Proceeding Series, 2014

16.2. Practice for concept mappers students from reading materials

16.2.1. ...is a generalization of...

16.2.1.1. Concept mapping activity

16.2.1.1.1. properties

16.2.1.1.1.1. "Learners struggling to create good Concept Maps are themselves engaged in a creative process, and this can be challenging to many, especially to learners who have spent most of their life learning by rote. "

Enlace: https://www.mendeley.com/viewer/?fileId=44a7c65d-7e07-f551-20ed-00327e069c47&documentId=71e81ea0-e531-390c-9e64-b6b08dfec86d#7

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2003

16.2.1.1.1.2. "Novak and Gowin noted that the act of mapping is a creative activity, in which the learner must exert effort to clarify meanings, by identifying important concepts, relationships, and structure within a specified domain of knowledge"

Enlace: https://www.mendeley.com/viewer/?fileId=44a7c65d-7e07-f551-20ed-00327e069c47&documentId=71e81ea0-e531-390c-9e64-b6b08dfec86d#22

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John W Coffey, Mary Jo Carnot, Paul Feltovich, Robert R Hoffman, Joan Feltovich, Joseph D Novak

2003

16.2.1.1.1.3. "A concept map assessment is composed of two parts: (a) a concept mapping task, and (b) concept map evaluation. The concept mapping task is defined by those procedures that result in the construction of a concept map representing a student's knowledge."

Enlace: https://www.mendeley.com/viewer/?fileId=3bed7713-a20b-6fe5-2a69-3853d4585163&documentId=2b0cc2a1-7444-3e5a-83fd-963acd74724a#3

Concept map assessment of classroom learning: Reliability, validity, and logistical practicality

John R. McClure, Brian Sonak, Hoi K. Suen

Journal of Research in Science Teaching, 1999

16.2.1.1.1.4. "A concept map is also able to represent personal knowledge, e.g. when a student is asked to generate a concept map specifying his/her personal understanding of a specific domain. "

Enlace: https://www.mendeley.com/viewer/?fileId=7b1ed3d4-4837-797f-37c1-a27479185f73&documentId=f74a517c-fc6c-3ee5-99ca-62d689bed956#3

Representing Domain Knowledge by Concept Maps : How to Validate Them ?

C M Representing Domain, Maps How, Them In, Dietrich Albert, T Honda, F W Hesse, Dietrich Albert, Christina M Steiner

Communication, 2005

16.2.1.1.1.5. "They can be used to display students' prior knowledge about a given topic, or they can be used to summarize what has been learned, for ex ample, after reading an assignment or completing some other classroom lesson. In this regard, Concept Mapping is often used for note taking or as a study aid."

Enlace: https://www.mendeley.com/viewer/?fileId=44a7c65d-7e07-f551-20ed-00327e069c47&documentId=71e81ea0-e531-390c-9e64-b6b08dfec86d#22

A Summary of Literature Pertaining to the Use of Concept Mapping Techniques and Technologies for Education and Performance Support The Chief of Naval Education and Training Pensacola FL 32500

John W Coffey, Mary Jo Carnot, Paul Feltovich, Robert R Hoffman, Joan Feltovich, Joseph D Novak

2003

16.2.1.1.1.6. "Concept Mapping is an excellent ex ercise for the promotion of creative thinking and identification of new problem-solving methods."

Enlace: https://www.mendeley.com/viewer/?fileId=44a7c65d-7e07-f551-20ed-00327e069c47&documentId=71e81ea0-e531-390c-9e64-b6b08dfec86d#7

A Summary of Literature Pertaining to the Use of Concept Mapping Techniques and Technologies for Education and Performance Support The Chief of Naval Education and Training Pensacola FL 32500

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2003

16.2.2. properties

16.2.2.1. Supporting evidences

16.2.2.1.1. properties

16.2.2.1.1.1. "Current instructional methods widely support verbal learning through linear and sequential teaching materials, focusing on isolated pieces of information. However, an important aspect of learning design is to facilitate students in identifying relationships between information. The transformation of linearity in teaching resources into integrated network models such as concept maps facilitates effective knowledge organisation by constructing relationships between new and existing knowledge. However, the manual construction of concept maps from teaching materials places an additional workload on the academics involved."

Enlace: https://www.mendeley.com/viewer/?fileId=2864c8a9-9328-fff9-0c9c-70dafc4572c7&documentId=6fe56908-f252-37a8-8c7e-cd8ef716eab6#1

A comprehensive text analysis of lecture slides to generate concept maps

Thushari Atapattu, Katrina Falkner, Nickolas Falkner

Computers and Education, 2017

16.2.2.1.1.2. " concept maps can assist learning from texts (Hilbert & Renkl, 2008). It is this latter application of mapping that is the focus of this article. Concept mapping as a follow-up strategy in text l earning can have several important functions. "

Enlace: https://www.mendeley.com/viewer/?fileId=2622cfbe-68c7-05dd-2781-47bdeb9578a3&documentId=575631d4-425b-3944-a843-dfcb90dd8107#2

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16.2.2.2. Benefits

16.2.2.2.1. "CM may help a learner to memorise a specific content in a meaningful way and also to promote, more casually, relevant reading comprehension skills. The extraction of significant terms from a text and the condensing of information into a comprehensive article is an important aspect for any learning strategy (Schnotz 1994). This process needs an intense and creative reading process (Scherner 1989) by promoting understanding and memorising of the content"

Enlace: https://www.mendeley.com/viewer/?fileId=37ff0e6e-5f7f-e885-1b6d-cd5c7eba170b&documentId=bed46e58-93e2-340e-a096-88de5741ccaa#3

Implementation of concept mapping to novices: Reasons for errors, a matter of technique or content?

Cathérine Conradty, Franz X. Bogner

Educational Studies, 2010

16.2.2.2.2. "we found that concept-mapping training may effectively transfer to text summarization skills that are closely tied to comprehension."

Enlace: https://www.mendeley.com/viewer/?fileId=0e083f8d-27f8-5137-2e45-6a5322c6aa57&documentId=ae1e6749-c88b-3677-ab03-ebfdb9f0cb5e#15

The effect of concept mapping to enhance text comprehension and summarization

Kuo En Chang, Yao Ting Sung, Ine Dai Chen

Journal of Experimental Education, 2002

16.2.2.2.3. "There have been numerous educational benefits in utilising knowledge organisation techniques over text representations. Among them, the use of knowledge maps as a knowledge organisation technique demonstrated significantly higher performance for recall, subjective concentration, and motivation over traditional text (Hall & O'Donnell, 1996)."

Enlace: https://www.mendeley.com/viewer/?fileId=2864c8a9-9328-fff9-0c9c-70dafc4572c7&documentId=6fe56908-f252-37a8-8c7e-cd8ef716eab6#2

A comprehensive text analysis of lecture slides to generate concept maps

Thushari Atapattu, Katrina Falkner, Nickolas Falkner

Computers and Education, 2017

16.2.2.3. Disadvantages

16.2.2.3.1. "Finally, if constructing a concept map from scratch helps students to focus on relevant aspects of the learning material, provision of worked-out maps may be even dispensable. However, it cannot be ruled out that constructing a map from scratch may be a too demanding task for students inexperienced with concept mapping and may therefore hinder learning success."

Enlace: https://www.mendeley.com/viewer/?fileId=2622cfbe-68c7-05dd-2781-47bdeb9578a3&documentId=575631d4-425b-3944-a843-dfcb90dd8107#4

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16.2.2.3.2. "Despite the positive effect of concept mapping, this learning strategy also poses high processing demands on learners. For example, in a study by Reader and Hammond (1994), participants learned from hypertext by either note-taking or concept mapping. Even though learners in the concept mapping condition performed better in a post-test on the learning topic presented in the hypertext, qualitative analyses showed that they failed to structure and integrate the information provided by the hypertext in a favorable way."

Enlace: https://www.mendeley.com/viewer/?fileId=2622cfbe-68c7-05dd-2781-47bdeb9578a3&documentId=575631d4-425b-3944-a843-dfcb90dd8107#3

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16.2.2.3.3. "Online documents provide a rich information res ource for aiding the generation of concept-map-based knowledge models, but analyzing resources to select concepts and links is a time consuming task. "

Enlace: https://www.mendeley.com/viewer/?fileId=4c81e59e-f87e-22a9-274d-451c45c58ee7&documentId=699ce83d-6c65-37c9-b099-1affbea9d03c#1

Jump-Starting Concept Map Construction with Knowledge Extracted from Documents

Alejandro Valerio, David B Leake

Concept Maps: Theory, Methodology, Technology. Proc. of the Second Int. Conference on Concept Mapping., 2006

16.2.2.4. Functions

16.2.2.4.1. properties

16.2.2.4.1.1. Reduction

16.2.2.4.1.1.1. properties

16.2.2.4.1.1.1.1. (a) Reduction function : Weaver and Kintsch (1991) found that macropropositions which contain the top-level information of a text are recalled in more detail. Maps can enhance the acquisition and retention of macrolevel ideas (O'Donnell, Dansereau, & Hall, 2002). Learners have to appraise the importance of concepts in order to decide whether they should integrate them in their concept map. Thus, learners concentrate on the most relevant macrostructure information of their learning topic.

Enlace: https://www.mendeley.com/viewer/?fileId=2622cfbe-68c7-05dd-2781-47bdeb9578a3&documentId=575631d4-425b-3944-a843-dfcb90dd8107#2

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16.2.2.4.1.2. Coherence

16.2.2.4.1.2.1. properties

16.2.2.4.1.2.1.1. (b) Coherence function: Concept mapping requires the externalization of knowledge and its structure. Thereby working memory is off loaded and the construction of coherence is facilitated (Kintsch, 1998). Labeling the links connecting nodes emphasizes the kind of relationship between concepts. Additionally, spatial arrangements or the use of similar colors can emphasize that concepts belong together. Thus concept mapping fosters the building of a coherent structure of knowledge.

Enlace: https://www.mendeley.com/viewer/?fileId=2622cfbe-68c7-05dd-2781-47bdeb9578a3&documentId=575631d4-425b-3944-a843-dfcb90dd8107#2

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16.2.2.4.1.3. Elabotation

16.2.2.4.1.3.1. properties

16.2.2.4.1.3.1.1. (c) Elaboration function: Due to the affordance of expressing notions in nodes and relations in links, concept maps foster elaboration processes (Weinstein & Mayer, 1986). This means that learners have to relate new information to their prior knowledge in order to determine what concepts are important and whether and how they interrelate. Knowledge and comprehension gaps can become obvious when constructing and explicating relations between"

Enlace: https://www.mendeley.com/viewer/?fileId=2622cfbe-68c7-05dd-2781-47bdeb9578a3&documentId=575631d4-425b-3944-a843-dfcb90dd8107#2

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16.2.2.4.1.4. Metacognitive

16.2.2.4.1.4.1. properties

16.2.2.4.1.4.1.1. (d) Metacognitive function: Metacognitive processes are supported through concept mapping. Knowledge and comprehension gaps can become obvious when constructing and explicating relations between concepts, (e.g., Chi, Bassok, Lewis, Reimann, & Glaser, 1989). At best, learners can overcome these gaps when they become aware of them.

Enlace: https://www.mendeley.com/viewer/?fileId=2622cfbe-68c7-05dd-2781-47bdeb9578a3&documentId=575631d425b-3944-a843-dfcb90dd8107#2

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16.2.3. activities

16.3. Practice of evaluating/validating for teachers

16.3.1. ...is a generalization of...

16.3.2. properties

16.3.3. activities