

## Scaffolding in a Medicine Education Intervention for Student Teachers Based on the PROFILES Three Stage Model

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☞ This paper focuses on describing the effects of scaffolding on the student teachers' learning process. The scaffolding is based on using information and communication technology in the PROFILES Three Stage Model; Scenario, Inquiry and Decision-making Stages. Six hours of medicine education intervention is conducted as a part of the student teachers' program in biology education. The scaffolded group is encouraged to work with the case and presentation templates, online, in Google Sites; the unscaffolded group work only with Word documents. During the Scenario Phase, student teachers discuss the important symptoms of flu, its prevention, and sources from which to find reliable information. In the Inquiry Phase, in the light of online materials and resources, student teachers recall and elaborate on these symptoms. In the Decision-making Phase, student teachers conclude their investigation by making a presentation with suggestions for treatment, and justify it with respect to reliable sources. The learning design is mainly based on the existing Internet site (Teaching children about the proper use of medicines). After their presentations, students reflect on questions that arise and discuss the subject. Results show that both groups discuss the reliability of different websites in the same way. However, the scaffolded group is quite effective in searching for information for their presentation, whereas the unscaffolded group has difficulties in finding relevant information. This suggests that by structuring the activity with Google Sites and presentation templates, scaffolding helps student teachers to work intensively and to prepare their presentations. Presentation modelling seems to be beneficial to the students' sense making process during the investigation, and it also supports them in coping with the collaborative case-based reasoning process.

**Keywords:** Medicine education, Presentation modelling, Scaffolding, Teacher education, Three Stage PROFILES Model

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## Uporaba tristopenjskega modela PROFILES pri zdravstvenem izobraževanju za prihodnje učitelje

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≈ V prispevku so predstavljeni učinki podpiranja učenja v procesu poučevanja prihodnjih učiteljev. Podpiranje učenja temelji na uporabi informacij in komunikacijske tehnologije v tristopenjskem modelu PROFILES – scenarij, raziskovanje in sprejemanje odločitev. V program študija prihodnjih učiteljev biologije je vključenih tudi šest ur izobraževanja o urgentni medicini. Skupino, ki je bila vključena v podpiranje, se je spodbujalo, da preučuje primer in uporablja že pripravljene osnutke predstavitev, dostopne na spletnih straneh Google Sites; skupina, ki ni bila vključena v podpiranje, pa je uporabljala le Wordove dokumente. V fazi scenarija so študentje razpravljali o pomembnih simptomih gripe, preventivnih ukrepih in o virih, ki nam nudijo zanesljive informacije. V fazi raziskovanja so s pomočjo prostodostopnih spletnih gradiv in virov analizirali te simptome. V fazi sprejemanja odločitev so študentje svoje raziskovanje končali s pripravo predstavitve predlogov zdravljenja, ki so jih podkrepili z zanesljivimi viri. Učni proces je bil večinoma oblikovan v okviru obstoječe internetne strani (Učenje otrok o primerni uporabi zdravil). Po predstavitvah so študentje razpravljali o vprašanih, ki so se pojavila, in o tematiki, ki so jo obravnavali. Izsledki kažejo, da obe skupini podobno razpravljata o zanesljivosti različnih spletnih strani. Vendar pa je bila skupina, ki je bila vključena v podpiranje, učinkovitejša pri iskanju informacij za predstavitev, medtem ko je imela druga skupina težave pri iskanju relevantnih informacij. Predpostavljamo lahko, da strukturiranje aktivnosti z Google Sites in s predstavitvenimi osnutki s podpiranjem pomaga študentom pri intenzivnejšem delu in pripravi predstavitve. Modeliranje predstavitve pripomore k temu, da študentje smiselno usmerjajo raziskovanje, prav tako pa jim to pomaga pri soočanju s procesom razmišljanja o specifičnih primerih v skupini.

**Ključne besede:** zdravstveno izobraževanje, modeliranje predstavitve, podpiranje, izobraževanje učiteljev, tristopenjski model PROFILES

## Introduction

Research shows that when properly scaffolded, the use of ICT (Information and Communication Technology) and collaboration have positive effects on students' learning (e.g. Demetriadis, Papadopoulos, Stamelos, & Fischer, 2008; Kukkonen, Kärkkäinen, Dillon, & Keinonen, 2013; Kukkonen, Kärkkäinen, Valtonen, & Keinonen, 2011; Quintana et al., 2004). Scaffolding is nowadays not only seen as originally being an activity belonging to a more capable person, but teacher and peer scaffolding can also be successfully accompanied with symbols, numeracy, representations of discipline, or forms of technology (Sherin, Reiser, & Edelson, 2004; Quintana et al., 2004).

Innovative, knowledge based, societies need young people who are equipped with a range of skills, such as problem solving, decision-making, communication skills, collaboration skills and reasoning skills (e.g. Hofstein, Eilks, & Bybee, 2010). In science education, one of the approaches to develop these skills is via the PROFILES Three Stage Model (e.g. Bolte, Streller, Holbrook, Rannikmäe, Hofstein, Mamlok Naaman, & Rauch, 2012). This aims to arouse students' intrinsic motivation through a student-familiar, socio-scientific context (the Scenario Stage), to offer a meaningful inquiry-based learning environment (the Inquiry Stage), and to use science learning in deciding on socio-scientific issues (the Decision-making Stage).

In this study, the PROFILES Three Stage Model is applied to the design of an integrated medicine education learning environment 'Flu' that aims to emphasise the development of critical thinking. The medicine education learning environment utilizes the Three Stage Model guidelines by: 1) awakening interest and critical thinking through a scenario, related to flu, 2) modelling scientific inquiries and developing problem solving skills, and 3) promoting decision making, applying the knowledge gained through inquiries, based on the Internet site 'Teaching children about the proper use of medicines.' The learning process is scaffolded through structuring as our interest is to discover what effects the scaffolding has on the learning process.

## Theoretical framework

Reiser (2004) offers two aims for scaffolding: the first is to support the learner in accomplishing the task, and the second is to support learning from the task and the improvement of future performance. These two goals imply two scaffolding strategies: namely scaffolding by structuring the task and scaffolding by problematizing. These strategies are connected to the learner's needs

for systematic investigation and profound argumentation, in order to overcome the challenges of learning in the discipline of science. According to Reiser (2004), in the assessment of information, tools can be a critical factor in tasks that involve accessing, manipulating, storing and reasoning; for example, visualisation with tools can provide conceptually meaningful representations and help users form deep models of the underlying system. Quintana et al. (2004) define three central processes for scaffolding during inquiry learning: 1) sense making as a process for testing hypotheses and interpreting data, 2) process management for controlling the inquiry process, and 3) articulation, as well as reflection, on the learning. Furthermore, according to Reiser (2004), situations where scaffolding is mainly needed in collaborative inquiry learning are: unfamiliar strategies (e.g. inquiry strategies), unfamiliar interaction practices (e.g. collaborative planning, evaluation, keeping track of alternatives), unfamiliar discourse practices (e.g. expressing hypotheses, arguing about evidence, "falsifying"), non-reflective work (learners tend to focus on the superficial aspects of products instead of the explanations and arguments they produce) and superficial understanding (e.g. non-scientific constructs and formal representations).

Teacher education should offer possibilities for students to develop skills, knowledge and habits required in conducting inquiry learning processes. According to the study of Holbrook and Rannikmäe (2007), the Three Stage Model promoted students' intrinsic motivation; students became more interested and engaged in the learning of conceptual science ideas and the undertaking of inquiry. The Scenario Phase motivated students towards recognizing the importance of attaining the science underlying the socio-scientific scenario; the Inquiry Phase promoted students towards creative thinking, encouraging student-student collaboration and an awareness of safe working, self responsibility and self-determination; The Decision-making Phase promoted students' argumentation and reasoning skills. Valdmann, Holbrook and Rannikmäe (2012) argued that through continuous professional development, there was a need to strengthen the interconnectedness of the Model components (the three phases should not be handled separately), to promote the teaching of argumentation and reasoning skills, and to increase teacher's first-hand experiences through practising decision making skills (see also Simon, 2012).

In this study, rational medicine use (the goal of medicine education) is defined as the right medicine taken in the right way, at the right time, for the right problem. Schools are increasingly considered to have excellent potential to impact on young people's health, and teachers are the key persons for promoting this in schools. According to the study of Hämeen-Anttila, Airakinen, Timonen, Bush and Ahonen (2006), the habits and attitudes of teachers

towards the use of medicines inevitably influence how they react to medicine education. Teachers are responsible for the choice of teaching methods, materials and topics and are therefore also ethical actors.

Leurs, Bessems, Schaalma and de Vries (2010) pointed out the importance of teachers' self-efficacy in the context of health education, to which medicine education also belong. Speller, Byrne, Dewhirst et al. (2010) also found that teachers who had received training in health promotion were more likely to be involved in health promotion activities in schools, their personal competence and motivation having an effect on the amount of health promotion undertaken. These two studies were in accordance with the study of Jourdan, Stirling, Mannix Mcnamara and Pommier (2011). The main factors that teachers identified as shaping their commitment were their perceptions of the health programme, particularly in its congruence with the teachers' own role and practice.

## **Method**

### *Participants and Data collection*

Six primary school teacher students participated in the study. They formed two groups: one group of three students was scaffolded while the other was not. Data was compiled from what had been produced by the students during the inquiry process and the recorded discussions relating to this. The discussions were recorded from both groups during (a) the Scenario, Inquiry, as well as the Decision-making Stages of the medicine education intervention; (b) from the general discussion at the end of study process and (c) during the student teachers' presentations that related to their inquiry.

### *Medicine education intervention*

Medicine education was part of the course "Teaching Approaches to Human Biology". The medicine education intervention altogether lasted six hours and its main aims were for student teachers to: learn to search for home resources in order to cure different symptoms of the flu; understand the proper use of self-care medicines; search for and evaluate information found on the net; learn group working skills; learn to present ideas to others; justify their arguments, and to understand that when home resources and self-care medicines do not help, a physician's evaluation is necessary.

The medicine education study module 'Flu' was based on the assignment and the information found on the Internet site "Teaching children about medicines" (which is planned, to be available in English). One group of three students was scaffolded, while the other group of three students was not. The

lecturer formed the scaffolded and unscaffolded groups which undertook to study “Flu” at random. The scaffolded group was encouraged to work with the case and presentation templates online in Google Sites, while the unscaffolded group worked only with Word documents. The study module ‘Flu’ concerned information on home treatment and self-care medicines, as well as on the proper use of medicines. The ‘Flu’ study module ([www.uef.fi/profiles](http://www.uef.fi/profiles)) was originally designed for medicine education in primary school (grades 4-6).

At the beginning of the intervention, using a shared blog, student teachers were asked to write about medicines and medicine education (Table 1). Student teachers discussed their preconceptions and created a list of all the facts concerning medicine education at the primary school level. A lecturer then briefly presented the idea behind the Three Stage Model that had been used in the medicine education module. During the first stage, based on the scenario, student teachers elaborated on different flu symptoms. In the Inquiry Stage, they were asked to recall and further elaborate on these features in the light of materials and resources found online; in the Decision-making Stage, both groups were asked to conclude their investigation by making a suggestion for the treatment and justify their recommendations based on information found from reliable sources.

The scaffolded presentation template included all phases belonging to the Three Stage Model: the Scenario, Inquiry and Decision-making Stages. The student teachers annotated and uploaded it to the Google Docs-environment; the unscaffolded group made their presentations themselves. At the end of the intervention, students were asked both to reflect on their own presentation and give peer assessment.

**Table 1.** *Content of the teaching sequences and aims of the ‘Flu’ study module.*

Lesson (90 minutes)	Content and aims of the lesson
1 <sup>st</sup> unit Scenario Stage	<p>Student teachers’ perceptions about medicine education (writings in shared blog).</p> <p>Groups formed by the teacher (3-4 student teachers in each group).</p> <p>The scaffolded group works with the presentation templates Online in Google Sites. The unscaffolded group works with Word documents.</p> <p>Presentation of Veijo’s problem.</p> <p>Discussion about Veijos problems (pre-knowledge).</p>
2 <sup>nd</sup> unit Inquiry Stage	<p>Teacher provides material for the study- three webpages.</p> <p>The student teachers familiarize themselves with symptoms of flu, the cure for flu with home resources and self-care medicines.</p> <p>The student teachers evaluate the reliability of information on the Net.</p>
3 <sup>rd</sup> unit Decision- making Stage	<p>In small groups, student teachers ponder the prevention of flu, as well as possible further action if home cures and self-care medicines do not provide effective treatment.</p> <p>Finally, class discussions are held in which justifications are to be presented.</p>

The scenario was the following:

“Veijo’s best friend Elmo, has not been at school for a couple of days because of flu. Now Veijo too has a sore throat and is sneezing. Is Veijo getting the flu and what are the symptoms? How can the flu be medicated with home resources or with self-care medicines? Veijo uses the word “flu” to search on the Internet. He gets lot of sites, but which of them can he trust? First discuss in your group: Which site can you trust?”

The task in the Inquiry Stage was for groups to become familiar with the cure of flu, using home resources, self-care medicines information from the Internet. Through group work, the student teachers pondered the following questions and recorded the answers to: What are the symptoms of flu? How can the flu be treated? What kinds of self-care medicines are used to treat the flu? When is a physician needed to treat the flu? How can the flu be prevented? From where can you find reliable information about flu symptoms and their treatment? The student teachers used three Internet sites that were concerned with flu symptoms, home resources for the treatment of flu, and self-care medicines:

Site: <http://www.uku.fi/laakekasvatus/sairaus-flunssa.shtml> (medicine education)

In English: [http://www.uku.fi/laakekasvatus/english-introduction-dear\\_reader.shtml](http://www.uku.fi/laakekasvatus/english-introduction-dear_reader.shtml)

Site: <http://www.tohtori.fi/?page=9401470> (health clinics, flu)

Site: <http://murobbs.plaza.fi/yleistä-keskustelua/725707-flunssan-hoito.html> (discussion forum)

The student teachers ranked the reliability and the clarity of the websites used by giving points for each site. The scale was 1=poor 2=moderate, 3=good, 4=excellent.

The Decision-making Stage included the following instruction: “Suggest to Veijo which website is reliable when searching for information about flu symptoms, its treatment, and the use of home resources and self-care medicines. Justify your proposal. In groups, discuss when and why flu symptoms need to be treated by a physician.” The group also presented practical recommendations for the prevention of flu at school and at home.

### *Data analysis*

Qualitative research methodology was used during the analysis of student teachers’ discussions (see Patton, 2002). In this study, in addition to the discussions, written language was also seen as a discourse. The focus was not on language as an abstract entity, but as the medium for interaction; analysis of discourse then became the analysis of what people did, or how they did it. Language was not taken simply as a tool for description and a medium for communication,

but as a practice, as a way of doing things. In this study, text-based documents were seen as social products that were situated constructions; particular kinds of representations shaped certain connections and understandings, which were properly studied through discourse analysis. (see Jørgensen & Phillips, 2002). According to Wood and Kroger (2002), discourse analysis is primarily an analysis that is carried out by using words, rather than by numbers or quantitative techniques. Thus, categorization is not included in discourse analysis.

## Results

The student teachers' learning process is here described, in the three phases studied, so as to answer to the research question "How does scaffolding influence the different phases of the learning process?"

### *Scenario Stage*

In the Scenario Stage, the scaffolded and the unscaffolded group basically gave the same list of symptoms. Both groups also pointed out in their discussions that flu symptoms typically include a runny or blocked nose, sore throat, sensation of pressure in the forehead and cheeks, as well as a cough. They also mentioned that a fever, cold sweats, shivers, headache, aching joints and limbs are symptoms of flu. For example, two girls in the scaffolded group drew up a list of symptoms:

*G2: Cold, fever, cough, sore throat and headache.*

*G1: Cough, sore throat, headache.*

Both groups gave many explanations as to how the flu could be treated and discussed it through their own experiences. They mentioned that alcohol, used externally (e.g. in the throat) eased a sore throat and cough; the scaffolded group additionally pondered whether alcohol was a bactericide:

*G3: Is it so that alcohol kills bacteria?*

*G1: Okay*

*G2: Home treatment: alcohol...*

Garlic with warm milk, warm woollen socks, inhaling steam over a pot of water, all helped a stuffy nose. According to the student teachers' own experiences, it was also important to drink and ensure a sufficient amount of fluids were taken. The unscaffolded group pondered various home resources:

*G1: What are home resources?*

*G2: A hot water bottle*

*B2: Yes, also eucalyptus pastilles, the aromatic ones*

*B1: Yes, and boiling a pot of water, removing it from the heat and breathing deeply through the nose*

*G1: I've done it so many times!*

Both groups pointed out self-care medicines intended for the treatment of the flu, naming several brands, such as Burana, Panadol, Finrexin and Strep-sils. The scaffolded group also pondered the role of vitamins and the definition of self-care medicine:

*G1: D-vitamin. This is in itself a treatment ...it is not a medicine*

*G2: It is a vitamin*

*G3: so, but... C-vitamin. I think that although it cannot prevent flu.... it obviously keeps up the resistance if you get the flu*

In the Scenario Stage, both groups highlighted their own experiences, and came to the conclusion that when the symptoms lasted for over two weeks, the flu needed to be treated by a physician. Both groups had good pre-knowledge about flu symptoms, home remedies, as well as self-care medicines, although the scaffolded group had a misconception concerning alcohol.

### *Inquiry Stage*

There were few differences during the inquiry stage discussions between the scaffolded and unscaffolded groups' knowledge about flu symptoms, home resources and self-care medicines (Table 2). Both groups were of the opinion that although medicines could not cure a common cold, they could be used to relieve the symptoms. Both groups also discussed the order of the symptoms. For example, the scaffolded group highlighted nasal symptoms (runny nose) when the cold started, after which came the cough. Only one difference was noted, the scaffolded group pointed out that symptoms might vary depending on the specific virus.

**Table 2.** *The Inquiry Stage, the scaffolded and unscaffolded groups' responses to the treatment of flu, using home resources and self-care medicines.*

Flu symptoms	Home resources	Self-care medicines
runny nose		
sore throat	alcohol, warm woollen socks,	Burana; Strep-sils, throat pastilles,
fever	vitamins, fruits, "alcohol socks",	hard candy, goach fluid (cough
headache	honey, garlic milk, saltwater	medicine), Bafucin, Vicky, Finrexin,
cold sweats	drops, hot water bottle	Nasonex, Resilar, C-vitamin,
shivering	drinking plenty of fluids	D-vitamin
aching joints and limbs		

During the inquiry process, student teachers discussed how to prevent flu. The unscaffolded group considered that antibiotics should not be used to treat symptoms, arguing that they thought antibiotics should be avoided:

*B1: Antibiotics decrease your own resistance*

*G1: I rarely want to take antibiotics, only if I am really sick*

*G1: Is it possible to say that preventing the use of antibiotics (is one solution to treat symptoms)*

*B1: I think that this is one of the aims of medicine education... people do not need to take antibiotics all the time. Nowadays doctors easily give a prescription for antibiotics...*

*G1: My opinion is also the same, doctors give antibiotics too easily*

*G2: I have so many unnecessary prescriptions in my home, but I did not want to take antibiotics from the pharmacy*

*G1: So antibiotics always reduce peoples' resistance*

The student teachers named different vitamins, such as vitamin C and vitamin D, which could prevent the flu. They mentioned their own experiences, for example, asthma symptoms could become worse as a result of a viral infection. One girl in the scaffolded group said that she increased her asthma medication for the duration of a cold, also that she had pain radiating to her ears due to a post-cold complication. Both groups considered that after two weeks it was important to go to the doctor, and mentioned symptoms, such as shortness of breath and a high fever.

Instead of the websites suggested, the unscaffolded group used Google when they searched for general information. The following is an example of the scaffolded group's discussion that related to information found while preparing their 'flu' presentation:

*G1: Are those the sources which we must use?*

*G2: We put it here ... up [made presentation]*

*G1: What are the symptoms of flu?*

*G1. Flu. Symptoms [read presentation template]*

*G3: Do we have such a question here? [read presentation template]*

*G1: There we have the symptoms, we must fill... here [fill presentation template]*

Both groups pondered on the reliability and clarity of the websites. The scaffolded group used all three websites that were given in the task. Although the unscaffolded group mainly used Google when they searched for information, they also briefly read the given websites. Both groups gave points for each given website: 1=poor, 2=moderate, 3=good, 4=excellent. Results showed that both groups pointed out that the Medicine Education website was the best,

because there were no commercials and that the University was the administrator of the site. The reliability of the website discussion forum was low because no administrator of the site was found and there were also many commercials (see Table 3).

**Table 3.** *The Inquiry Stage, students' evaluation about the reliability of the websites. (1=poor, 2=moderate, 3=good, 4=excellent)*

Classification	Medicine Education		Doctor.fi		Discussion forum	
	scaffolded	unscaffolded	scaffolded	unscaffolded	scaffolded	unscaffolded
Administrator of the site easily found	4	3	3	3	1	1
Administrator of the site is a reliable organisation	4	3	3	3	1	1
Information on site is justified	4	4	4	4	1	1
Sites include few commercials	4	4	4	4	1	1
Text is understandable	4	4	4	4	1	1
<b>Total</b>	<b>20</b>	<b>20</b>	<b>18</b>	<b>18</b>	<b>5</b>	<b>5</b>

The unscaffolded group read many websites other than those recommended. However, both groups assessed all three of the recommended websites in the same way. Also the student teachers indicated misconceptions which might come to influence their medicine education teaching (cf. Hämeen-Anttila et al., 2006)

### *Decision-making Stage*

In the Decision-making Stage, the unscaffolded group discussed the benefits of the website 'Medicine Education' and the deficiencies of other websites; although they gave a list of solutions to Veijo, explanations were lacking. This same group also highlighted the role of Google in the decision making.

*B2: Is it possible to recommend the website Medicine Education? It is fast, good and clear. Obviously Veijo does not need anything ... he is not so ill that he needs to search for information from the website Tohtori.fi*

*B1: Okay*

*G2: What website was good?*

*B1: Medicine Education was good and concise. The second best website was Tohtori. fi, but it was too extensive*

*B2: Because it is meant for doctors*

*G2: The example of pancreatic cancer. (Before this, Bihad talked about his experiences*

*when he was searching for information on pain symptoms.)*

*B1: These two websites were quite reliable and rational, but the Discussion forum on the website was the lowest of the low. (Earlier B1 had said that he found a diagnosis of pancreatic cancer when he read the text about symptoms of pain)*

*B1: Sports, good health, good diet, healthy lifestyle*

*G2: Being glad, sunshine, outdoor activities*

*B1: Vitamins*

*G2: One's own attitude*

*B2: Washing hands*

In their presentation, the scaffolded group highlighted that if someone wanted to prevent getting the flu, it was important to understand what caused it. Their discussion also highlighted that when making practical recommendations for flu prevention at school and at home, it needed to be emphasized that the flu was a contagious disease; people either inhaled infected droplets in the air or came in direct contact with an infected person's secretions. To prevent flu, one should be sure to keep one's hands clean, wash them frequently and thoroughly to remove germs.

*G3: It is good hygiene*

*G2: This is possibly the main thing*

*G1: Warm clothes*

*G1: But preventing it. Covering a cough helps*

*G2: Even though you don't sneeze you must still wash your hands.... (she explains how the flu virus can transfer to your hands by touching surfaces.) Do we have enough arguments in our presentation?*

The scaffolded group also mentioned two types of vaccines that give protection against flu.

*G2: The influenza vaccine*

*G1: So can you prevent flu?*

*G3: But is the vaccine for the common cold or is it for influenza?*

*G1: Yes, the vaccine is for influenza and the annual flu*

*G2: Nowadays there is a vaccine for the annual flu*

*G1: Yes, in the newspaper it was said that many people go to the health station and book a time to get the flu vaccine. This is just the annual flu vaccine.*

After their oral presentations, both groups discussed the Three Stage Model and evaluated their presentations, as well as their own work; they also gave peer assessment to the other group. Table 4 presents the conclusion of both

this self-assessment and the peer assessment concerning the Three Stage Model. In this respect, there were no big differences between the groups. The scaffolded group's inquiry process was more intensive, because they used the given websites (not Google); they also highlighted the reliability of the websites in their presentation and in the Decision-making Stage, and included arguments and multiple decisions for treatment suggestions. This group also answered the given questions and pondered on how to prevent the flu.

**Table 4.** *Teacher students' conclusion of their self and peer assessment evaluation.* (+++ = very good, ++ = good, + = poor)

	Scaffolded group	Un scaffolded group
1. Scenario (pre-knowledge)	+++	+++
2. Inquiry process (searching for information)	+++	++
3. Decision-making Stage (argumentation)	+++	++

In their inquiry, the student teachers seemed to benefit from the structuring of the task. Argumentation in the Decision-making Stage was also shown to be better with the aid of structuring (see Reiser, 2004; Quintana et al., 2004).

## Conclusions and Implications

One group of student teachers, whose studies related to medicine education, was scaffolded with a structured environment, while another group, undertaking the same studies, was not scaffolded. The scaffolded presentation modelled on the Three Stage Model, seemed not only to have been beneficial for the sense-making process during the inquiry, but also supported the collaborative inquiry process. This suggested that the approach of using a Google Sites template, which included the Scenario, Inquiry and Decision-making Stages, helped in the formulation of conclusions and fulfilled the learner needs that Reiser (2004) claimed to be important in collaborative inquiry learning.

The student teachers had extensive experiences related to the flu; they had general knowledge, their own experiences of flu symptoms, as well as knowledge of home resources and treatment. Nowadays, the Internet provided valuable resources and opportunities to seek for information about medicines, but it was important for Teacher Education to highlight the importance of evaluating their reliability. During the Inquiry stage and the discussion with peers, it was possible to argue against treatment. Because the habits and attitudes of teachers concerning medicines inevitably influenced how they reacted

to Medicine education (see Hämeen-Anttila et al., 2006), it was important for them to share their own perceptions about medicines as well as medicine education. The Decision-making Stage helped in understanding the real-life connections between the task and the topic, and coupled with the Inquiry Stage, improved student teachers' critical thinking ability, one of the aims of science education (see Hofstein et al., 2010).

Medicine education must not only offer information, but must also foster motivation and provide the skills necessary to accomplish the health goal (Hämeen-Anttila et al., 2006). The scaffolded groups' Inquiry Stage is particularly active and intensive: arguments are proposed when evaluating the information. The content of both groups' presentations is good; both highlight that the common cold is regarded as a viral disease and is the most common human ailment. The treatment proposal is in agreement with the website on Medicine Education: rest, plenty of drink, and vapour inhalation therapy is recommended to relieve the symptoms. The student teachers point out that, although home treatment is sufficient, it is also possible to use over-the-counter medicines to treat symptoms, such as pain, fever and nasal congestion. This is also in accordance with the aims of the Medicine Education website. It is interesting that only the scaffolded group point out that cold viruses easily spread through the air at close range and via direct contact through people or inanimate objects and surfaces. This is an important point relating to the prevention of the flu.

The PROFILES Three Stage Model gave student teachers the possibilities to work collaboratively and enabled them to make comparisons between the Scenario, Inquiry and Decision-making Stages. Both the scaffolded and unscaffolded groups had multiple solution paths, as no final goals were stipulated at the beginning of the task. The scaffolded presentation model helped progressive inquiry learning especially in information seeking, and this same group gave more argumentation concerning the treatment of the flu, as well as suggestions for its prevention. Student teachers needed scaffolding for the learning process to be effective. Despite the fact that this study increased and broadened researchers' and teacher educators' knowledge about the challenges of medicine education in Teacher Education, there was still a need for further research concerning scaffolding and the role of information and communication technology in medicine education. The recommendations made in the study by Valdmann et al. (2012) as well as in the study by Speller et al. (2010) concerning continuous professional development, were also possible to include in our further studies. One example of these was that in the medicine education context, it was important to give student teachers first-hand experiences by undertaking decision making exercises coupled with continuous professional development.

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