

TEACHER EDUCATION AS A PROMOTER OF HEALTH: TEACHER STUDENTS' PERCEPTIONS ABOUT MEDICINE EDUCATION

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Abstract

Being a part of health education from primary school to the university level, medicine education is a fairly new opening in the field of education. The purpose of this study was to clarify Finnish primary school teacher students' (N=21) perceptions about medicine education. Data was collected in several ways: a questionnaire, shared blog writings and group discussions. Teacher students' perceptions about the content of medicine education were quite limited. Although they were well aware of the importance of the proper use of medicines, they also highlighted the discussion of misuse, which is not in accordance with the aims and methods of medicine education. Teacher students only mentioned a few methods on how to teach the proper use of medicines, having themselves had few experiences of medicine education from their own time at school. In teacher education, medicine education could be developed using teaching methods that particularly concentrate on the critical search for information, also emphasizing the importance of modeling, and co-operation with parents and health experts. This study increases and broadens researchers' and teacher educators' knowledge about the challenges of medicine education both in teacher education and in schools.

Key words: health education, medicine education, proper use of medicines, teacher education.

Introduction

School health education is one forum where the process of empowerment as a medicine user could be facilitated. Being a part of health education from primary school to the university level, medicine education is a fairly new opening in the field of education in Finland. School-based medicine education is also rare worldwide. Previous studies concerning medicine education in the school context, focus on examining teachers' and children's perceptions about medi-

cine education and the use of medicines (e.g. Bush & Hardon, 1990; Hämeen-Anttila, Juvonen, Ahonen, Bush & Airaksinen, 2005; Hämeen-Anttila, Airaksinen, Timonen, Bush & Ahonen, 2006; Cebotarencu & Bush, 2007; Hämeen-Anttila & Bush, 2008; Kärkkäinen, Hämeen-Anttila, Vainio, Kontturi, Patrikainen & Keinonen, 2014; Siitonen, Hämeen-Anttila, Keinonen, & Vainio, 2014). Wherever pre-service teachers are trained, positive attitudes towards teaching health-related topics are essential for the success of health education programmes. Davidson (2007), Leurs, Bessems, Schaalma and de Vries (2007) as well as Marks (2009), indicate that training in health education alters teachers' attitudes towards teaching about health issues.

In spite of the widely recognized importance of health education, there are rather few studies that focus on the teacher education context (e.g. Byrne, Almond, Grace, & Memon, 2012; Guével & Jourdan, 2009; Kealey, Peterson & Gaul, 2000; Paakkari, Tynjälä & Kannas 2010a, b; Speller, Byrne, Dewhirst, Almond et. al., 2010; Walsh & Tilford, 1998). Teacher students' perceptions of medicine education are also largely unknown in Finland therefore this present study can be used as a framework for developing medicine education in teacher education. In practice, this study provides information about primary school teacher students' perceptions; these students have already completed all obligatory science (biology, geography, physics and chemistry) courses in teacher training.

Medicine Education as a part of Health Education

In Finland from grades 1-4 (7-11 year olds) health education is taught as part of the environmental-and-natural-studies subject group; in grades 5-6 (12-13 year olds) it is a part of biology/geography and physics/chemistry and from grades 7-9 (14-16 year olds) it is a stand-alone subject. In basic education (grades 1-9) the foundation of health teaching is for pupils to understand health as a physical, psychological and social capability. The task is to develop pupils' cognitive, social, functional and ethical capabilities, as well as their capabilities for regulating emotions. The health subject is pupil centered and supports functionality and inclusion. Teaching must be based on children's and young people's everyday lives, their growth and developmental needs and the course of human life. It aims to develop important skills related to the acquisition and application of information and to promote critical reflection on the values of health and wellbeing. (National core curriculum, 2004.)

The use of medicines is a common activity for almost everybody, including primary school children (Dengler & Roberts, 1996; Chambers, Reid, McGrath & Finley, 1997; Stoelben, Krappweis, Rossler & Kirch, 2000; Hansen, Holstein, Due, Currie, Yahni & Laplante, 2003). In most homes, medicines are spread all over the house, and children have ready access to them (Sanz, Bush & García, 1997). Children's knowledge and attitudes towards medicines have been studied most widely in the USA and it has been shown that facts associated with medicine efficacy are confusing for children (see, e.g. Bush, Iannotti, & Davidson, 1985; Menacker, Aramburuzabala, & Bush, 1999). How can knowledge about medicines be best provided in the school and teacher education context?

According to the study of Hämeen-Anttila et al. (2005), education from an early age about the rational use of medicines, may help reduce the general public's misuse of medicines, increase the rational use of them and decrease health risks. The rational use of medicine, which is the goal of medicine education, is defined as being the right medicine, taken in the right way, at the right time, for the right problem. Medicine education is not about scaring children, urging them to use more medicines or using them independently, it is about learning a skill for everyday life before the child becomes personally responsible for his/her own health. Medicine education also differs from traditional drug education that mainly addresses substance abuse issues. (Hämeen-Anttila et al., 2005.)

Teachers and Medicines

According to the results of Siitonen et al. (2014) both primary (76 %) and lower secondary school teachers (89 %) view medicine education positively. Although the low minority of teachers had taught the specific topics related to medicine, i.e. knowledge of what medicines are and the prerequisites for the proper use of medicines, the majority had taught topics related to illness and the incorrect use of medicines. Siitonen et al. (2014) found that teachers viewed medicine education as a part of teaching about illness or teaching it in parallel with the incorrect use of medicines. According to the results of Hämeen-Anttila et al. (2006), the highest proportion of Finnish teachers (42 %) indicated that the best age to begin medicine education would be 11-13 years or 9-11 years (25 %). However, there were teachers who considered that medicine education should begin when the children are 7-9 years old. Teachers also stressed the importance of drug education, i.e. teaching about the dangers associated with the abuse of medicines. Drug education was considered an important part of health education, but teachers also felt that learning such an everyday life skill such as the rational use of medicine, should not be underestimated.

With regard to medicine education, Hämeen-Anttila et al. (2006) found three different types of teachers: empowering, paternalistic and material-evaluating. Empowering teachers wanted to teach children the principles of medicine use and to encourage them to use medicines rationally and safely, also highlighting knowledge about suitable medicines for treating common symptoms. Paternalistic teachers felt that parents were responsible for their children's use of medicines and pointed out that it would be good to educate children about the dangers related to this. They also emphasized the importance of a healthy lifestyle. Material-evaluating teachers mainly commented on the usefulness of medicine education materials, without expressing any attitudes towards medicines. Teachers' own habits and attitudes towards the use of medicines will inevitably influence how they react to medicine education. In order to educate children about medicines, teachers must acknowledge their own important role and have a positive rationale. Teachers are also responsible for the choice of teaching methods, materials and topics and are therefore also ethical actors.

School teachers were not considered to be a source of medicine information by children in Canada and Finland (Chambers et al., 1997; Hämeen-Anttila et al., 2006), but Greek children ranked their teachers second to physicians, as being a source of information (Bozoni, Kalmanti & Koukouli, 2006). Hämeen-Anttila et al. (2005) highlighted that medicine education in schools did not reduce the role of health care professionals, but rather created a new channel for educating empowered and rational medicine users for the future. They found that children preferred the Internet as one of the main tools for learning about medicines. Gray et al. (2005) also highlighted that especially for older children, the Internet seemed to be an important source of health information.

According to Leurs et al. (2007), teachers' self-efficacy and staff support seemed to exert the greatest influence on the success of a health programme. Teachers, who in the previous year had addressed three or more issues on health education, had more confidence in their own skills than the teachers who had failed to address a minimum of three issues; they were able to conduct health-promotion activities in class even though they perceived the themes to be difficult. According to Jourdan, Stirling, Mannix McNamara and Pommier (2011), the main factors that teachers identified as shaping teachers' commitment were (1), their perceptions of the health programme, particularly its congruence with the teachers' own role and practice, as well as the perceived impact of the health programme upon the whole of staff relations. (2), the specific school environment which included the school organization, the quality of relationships with parents and student behavior. If health education programmes are to be successfully developed in schools, it is necessary to anchor them into the schools' mission and to make sense of them regarding teachers' educational perspectives. There should also be an awareness of the internal tensions that health programme implementation can engender among the whole staff. (Jourdan, Pommier & Quidu, 2010; Jourdan et al., 2011.)

According to previous studies concerning Finnish science teacher education (see, e.g. Dumbrajs & Keinonen, 2008, 2009) teacher students have adopted a modern view of science education and a constructivist approach to knowledge. Dumbrajs and Keinonen (2009) also highlighted that in teacher education, teachers' permanent personal traits should be acknowledged. It seemed that the degree of subject knowledge as well as knowledge about methods and approaches, had little influence on the types of teachers; more important might be their life path and childhood experiences, as well as psychological dispositions. This is in accordance with the study of Speller et al. (2010). They highlighted that continuing professional development is important to raise teachers' knowledge and skills regarding health promotion. Furthermore, teachers who received training in health promotion were more likely to be involved in health promotion activities in schools, also personal competence and motivation had an effect on the amount of health promotion undertaken.

Schools are increasingly considered to have excellent potential for impacting on young people's health, reducing the vulnerability of young people to poor health behavior and its negative outcomes in later life and thus resulting in a positive impact on their health throughout their lifespan (e.g. Mükoma & Flisher, 2004; St-Leger & Young, 2009). Teachers are the key persons in promoting health at schools; teacher-training courses are therefore considered to play a key role in developing effective health education projects. To enhance future teachers' knowledge about medicine education, it is essential for teacher education to help students develop skills regarding the search for information and critical thinking. As teacher students' perceptions of medicine education are still largely unknown, this study aimed to focus on the following questions:

- What are primary school teacher students' perceptions of medicine education?
- What are primary school teacher students' perceptions about the role of teacher in medicine education?

Methodology of Research

General Background of Research

The aim of this study was to clarify primary school teacher students' (N=21) perceptions of medicine education and the teacher's role in it. The group of participants comprised of 15 female and 6 male students. The context of the study was a curricular course, "Teaching Approaches to Human Biology" which focused on human anatomy and physiology and included 6 hours of lectures and 20 hours of practice. The course (3 credits) was voluntary for primary school teacher students and belonged to the multidisciplinary studies of the subjects in basic education. Through collaborative inquiry-based learning approaches as well as laboratory activities, the course aimed to encourage teacher students to gain deeper understanding of different anatomy systems, organs, tissues and cells. As a part of the course the teacher students carried out an inquiry regarding some illnesses that were provided as examples, which could later be used in inquiry at the primary school level. Finally, the students presented their inquiry reports to each other, the results were compared, and ideas were discussed in seminars. The study was carried out in January–February, year 2013.

Instrument and Procedures

The research data consisted of students' written work in a shared blog, responses from the questionnaire, as well as data from group discussions. Firstly, the teacher students were asked to write anonymously into a shared blog (45min), their perceptions about medicine education and the role of the primary school teacher in it. A shared blog was used because accord-

ing to Schön (1987), teachers are supposed to develop their pedagogical knowledge and understanding through critical reflection. Critical reflection processes are triggered by an unexpected or puzzling event which cannot be handled with daily routines (Schön, 1987). It has also been noticed that the reflection process is in connection with the community, their values, shared knowledge and goals (Shulman & Shulman, 2004). In this study it is resumed, as Reiser (2004) suggested, that blogging could support accomplishing the task through promoting teacher students' collaborative acquisition of knowledge and skills in order to conduct critical reflection and the refining of future teachers' knowledge.

Secondly, the teacher students were given a questionnaire (15 minutes) to answer. This structured questionnaire was adapted from similar studies that related to teachers' ideas on medicine education in Finland (Hämeen-Anttila et al., 2006; Siitonen et al., 2014) and in the UK (Horne, Weinman & Hankins, 1999, Horne et al., 2001). The questionnaire consisted of five sections in which there were 22 questions, both structured and open-ended. Three sections were used in this study; beliefs about medicines, teaching illnesses and medicine related topics, as well as the respondents' background information and their perceived skills of teaching these topics. On a five-point Likert scale (Strongly disagree=1, Disagree=2, Uncertain=3, Agree=4 and Strongly agree=5), the respondents were asked to indicate their measure of agreement with each statement. The teacher students' own perceived skills for teaching 15 topics related to illnesses and medicines, were measured by asking the respondents to rate their own teaching skills on a five-point Likert scale (Poor=1, Quite poor=2, I can't say=3, Quite good=4 and Good=5). Background information included, e.g. questions about gender, previous studies concerning health education at the university level, as well as their attitude towards school medicine education.

Thirdly, in groups, the teacher students discussed their perceptions and the role of the primary school teacher in medicine education (30 minutes); these group discussions were tape-recorded and transcribed verbatim. In the next phase, the teacher students carried out a small-scale inquiry (three hours) and the discussion during inquiry process was also tape-recorded. All the teacher students were informed about the purpose of this study; participation was voluntary and each student had been given the opportunity to anonymously decline taking part.

This study followed a case study design (Gomm, Hammersley & Foster, 2000). These data collection methods were used for a specific purpose, namely to capture the teacher students' perceptions of medicine education and to achieve as complete and diversified picture of these perceptions as possible.

Data Analysis

The teacher students' written work in a shared blog formed the main data in this study and it was analyzed using inductive content analysis. Inductive content analysis (see Roth, 2005) was chosen in order to reveal the themes and details that the teacher students connected to medicine education, as well as the variance in their answers. Both inductive and deductive methods were used in analysis of the data. The analysis unit could be a single word, a sentence, or a group of sentences representing the idea related to some concept under study.

The questionnaire was also qualitatively analyzed because of the low number of teacher students taking part. The research question under focus was answered from several perspectives due to the variety of the data sources. In this study, data triangulation would increase confidence in the research data; when similar conclusions are drawn from all of the methods, then validity will have been established.

Results of Research

Questionnaire

All the teacher students answered that they had had no studies concerning health education even though biology was an obligatory course for primary school teacher students. All teacher students had a favorable attitude towards school medicine education also. Figure 1 presents teacher students' evaluation about their ability to teach topics concerning medicine education to children.

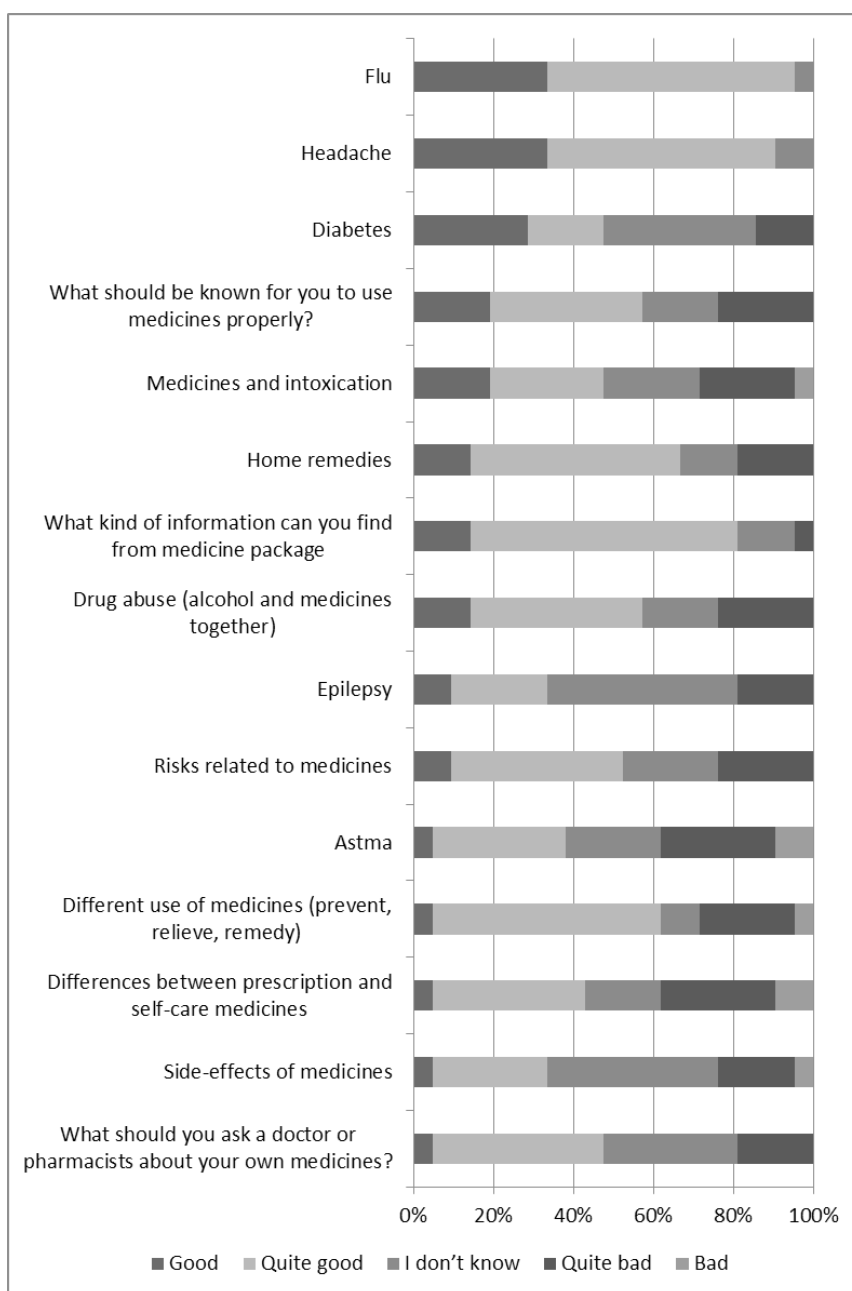


Figure 1: Teacher students' (N=21) evaluation about their ability to teach medicine education topics to children.

Based on the answers in the questionnaire, findings showed that the teacher students had good knowledge for teaching about flu and headaches and offered suitable home remedies for their treatment, but had poor knowledge for teaching about asthma, epilepsy and diabetes. Teacher students also pointed out the importance of teaching home remedies as a part of medicine education. Most of them considered prescription medicines to be less important than vaccines and highlighted the role of over-the-counter medicines (e.g. Burana, Ibuxin, Panadol) in medicine education. (Figure 1.)

Five most important topics in medicine education according to teacher students are shown in Figure 2. The statements were the same as in Figure 1.

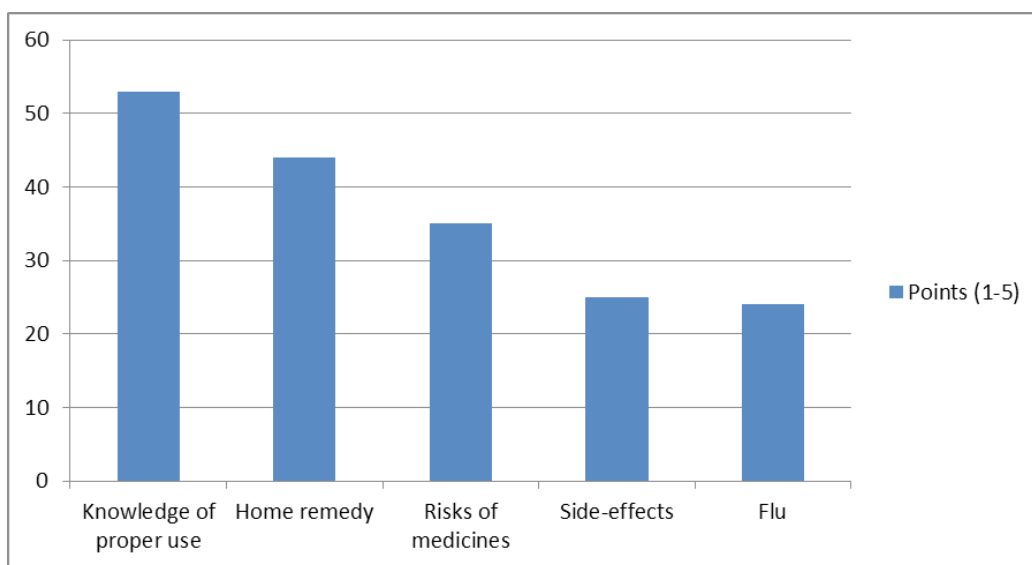


Figure 2: Teacher students' perceptions of the five most important topics in medicine education.

Teacher students answered that in their opinion, the most important topics in medicine education were knowledge about the proper use of medicines, home remedies, risks related to medicines, side-effects and flu (see Figure 2).

Written Work in a Shared Blog and Group Discussions

After classification of the blog writings, it was found that the teacher students' expressions could be classified in six categories. Altogether 178 ideas were described, the frequencies of which are presented in different categories in Table 1.

Table 1. Categorization of teacher students' descriptions about medicine education, and the role of the primary school teacher in medicine education.

Category	Subcategory	Frequency	Total
Issues for discussion in medicine education concerning medicines	Impacts of medicines	12	45
	Dosage	8	
	Alternative medicines	7	
	Situation when you take the medicine	6	
	Injurious effect	5	
	Preventative effect	3	
	Side effect	3	
	Medicine company	2	
	History of medicine	1	
2. Medicine education concerns the way to use medicines	Proper use	20	45
	Misuse	17	
	Responsible use	8	
3. Content of medicine education	Inflammation/allergy/cancer/ asthma/ diabetes/epilepsy/obesity	8	35
	Painkillers	7	
	Pupils own medicines	5	
	Prescribed medicines	4	
	Common medicines	4	
	Fever	2	
	Flu	2	
	Contraceptive pills	1	
	Antibiotic	1	
	First aid	1	
	4. Teaching methods	The use of experts	
Discussion		6	
Teacher presents facts		3	
Differentiate		2	
Searching information		2	
Critical thinking		2	
5. Context to be used	Integration	1	16
	Everyday life	5	
	Biology	3	
	Health life	3	
	Health education	3	
6. Primary school teachers' role in medicine education	Time of teaching	2	14
	Important role	5	
	Challenging role	4	
	Minor role	2	
	Neutral role	2	
Total	Teacher as an example	1	178

Issues for Discussion in Medicine Education Concerning Medicines

The teacher students listed many issues which should be discussed during medicine education; the impact of medicines, dosage, alternative medicines and side effects, some of which could be harmful. According to the opinions expressed in shared blog writings, teacher students considered it important to know how the human body works, what kind of effects medicines have on the body as well as knowledge of human biology, for example, the digestive and circulatory system. Teacher students did not differentiate between the behavioral and physical effects of medicines. They wrote about the system level of the human body but they did not write anything about body issues or cells.

"...it would also be important to let pupils know how medicines work in the human body and what the long-term effects from the use of pain-killing medication can be." Student20

"Pupils should know how to use medicines to improve their state of health and understand how these affect the body." Student21

In their blog writings, teacher students linked dosage and the possible harmful side effects of medicines. Teacher students did not exactly write about how to reduce the risk of harmful side effects and, if experienced, what the pupil should do and from where to get help. The effect of the medicine would depend upon its kind, the size of the dose, and how frequently it was taken.

"It is important to teach about the dosage of medicine and the situations in which medicine should be used. It is also important to say that in the case of illness, medicines can be dangerous if they are used too much or the wrong medicine is chosen. Medicine abuse can even kill." Student14

"Medicines also have side effects. Medicine education should also include discussion on medicine dosage." Student15

Teacher students wrote that medicines work in a variety of ways, depending on what for and how the pupils have taken them. They wrote about and discussed that some medicines, if taken at the same time, could cancel out the benefits of each other. As some medications can increase or decrease the rate of absorption and metabolism in the body, it is important that medicine education teaches pupils to follow the instructions given for their use. Teacher students also wrote about the alternative ways of treating and curing an illness, although no examples or explanations were given. During their discussion, they highlighted home remedies and gave examples of these for cold and flu. Teacher students also drew attention to the issue of side effects. This is an important topic for medicine education as all medicines including herbal preparations, vitamins, as well as over-the-counter and prescription medicines, do have side effects. Alternative practices of medication were discussed which arose from the teacher students' own experiences and knowledge of traditional methods, e.g. homeopathy and acupuncture.

"It is important to identify varying conditions, is medication really needed or is there some alternative way." Student8

"However, the use of medicines can be replaced by some other way of treatment." Student11

Some of the teacher students wrote that medicine education should include the personal level as well as the societal level. The societal level meant that the whole of society is undergoing a medicalization process; discussion about medicine companies' and medicine factories' role in society as well as the history of medicines, were issues which were considered to be important in medicine education.

“Nowadays it is relevant to consider medicines regarding the pharmaceutical industry, medicine history and especially the phenomenon of medicalization.” Student9

“What is the role of the medicine company in our society?” Student19

Teacher students also spoke about how medical technology has greatly increased life expectancy. They felt it important for medicine education to discuss the rise of resistant micro-organisms in our society due to the excessive use of antibiotics, thus drawing attention also to the negative effects of modern medicines in our society.

Medicine Education Concerns the Way to Use Medicines

The teacher students defined medicine education extensively and almost all of them wrote that it should concern discussions about how to use medicines (Table 1). They pointed out the proper use of medicines but also the misuse, which is contrary to the aims of medicine education. Most of them (17) agreed that school medicine education should include issues concerning both the misuse and proper use of medicines and that ‘misuse’ should include knowledge such as ‘how to avoid poisoning’ as well as ‘the abuse of medicines’.

“Medicine education is about the orthodox use of medicines but abuse must also be discussed so that the warnings are not just rhetoric (researching for the potential effects). Therefore, it is to tell the facts that abuse can lead to serious unwanted outcomes.” Student15

The proper use of medicines was discussed; it should include knowledge, promoting a rational attitude or awareness towards medicines, as well as taking the right medicine at the right time with the right amount.

“I think that medicine education is about discussing the correct use of medicines.” Student5

“Students will become familiar with the proper use of medicines and their effects. Also, a different general awareness about medicines would then be included in the medicine educational system.” Student22

Although the teacher students also highlighted responsibility in the use of medicines, they did not exactly say what actually was meant. One said that as pupils develop differently, it is important to find out when it is appropriate to allow pupils more independence and responsibility concerning the use of medicines.

Content of Medicine Education

According to the teacher students, there should be a wide variety of content in medicine education. Illnesses were seen to be a part of medicine education; in their writings, students mentioned short-term illnesses, long-term illnesses and their medication.

“I would connect medicine education to serious illnesses such as diabetes and epilepsy as well as the treatment of inflammatory diseases (e.g. flu).” Student3

“There is not always even a need for painkillers. It would be good to say something about antibiotics. It would also be good if students could discuss medicines without fear. Allergy medicines make you tired and parents purchase expensive products.” Student6

Flu and a fever were suggested as issues for discussion with pupils. There were few descriptions about prescribed medication in the teacher students' blogs.

"Your medicines must not be given to someone else; a person's own doctor prescribes medicines that are for personal use only." Student15

Teacher students did not use the concept of 'over-the-counter medicines.' They wrote about common medicines and painkillers that could be bought without a prescription and considered it important to discuss medicines that were used by the pupils themselves.

"Medicine education could cover the most common medicines and collect information on their use." Student8

"...also become familiar with the most common medicines, e.g. painkillers" Student19

One teacher student wrote that medicine education should include teaching pupils about contraceptive pills.

"Also, especially for young people, the most commonly used medicines may be contraceptive pills." Student21

Teacher students discussed how teaching about contraceptive pills is quite a controversial topic at the primary school level.

One issue pointed out in their blog writings was first aid; this is already one content area in our primary school curriculum.

"...first aid (where I play, what I do, etc.)" Student7

Teaching Methods

Teacher students were only able to present a few ideas for teaching activities in medicine education. For example, they mentioned critical thinking, searching for information, talking and discussion. Teacher students also wrote about integration and differentiation in teaching.

"Pupils should be taught to find out, look at, think critically about medicines and be taught how to take medicines themselves." Student4

"We should discuss with the students how medicines are used correctly and in which situations particular medicines are appropriate to use (and how much)." Student6

Some of the teacher students (17) thought that they would call on experts to provide medicine education. In their group discussions, they also mentioned that they would encourage communication between the teacher and health professionals, the school nurse for example. Teacher students mentioned that the school nurse could visit the class and give some lessons about medicines; they also discussed how to encourage pupils to ask their healthcare practitioner about medicines and thought that medicine education should take into account giving the information that children want about medicines. However, there was no mention of what health professionals think children should know.

"Taking advantage of SPECIALIST HELP in medicine education." Student21

"The teacher is not necessarily the most qualified person to give comprehensive information about medicines, therefore it may be difficult to give the correct answers to questions raised

by the students. Medicine education lessons could be provided by the school nurse or even a local pharmacist, for example.” Student18

Context

Teacher students considered that pupils should receive the basic information about medicines and felt that it would be possible to teach medicine education during biology lessons.

“Teachers can e.g. talk about medicines during biology lessons.” Student7

“It is possible to bring up some basic elements in the biology lesson.” Student1

That medicine education should be included in primary school was also mentioned, however, it was emphasized that the teacher must understand that each grade demands the teaching of different issues.

“I think that the primary school teacher could give medicine education to young students, regardless of their different ages.” Student15

In group discussions, the teacher students highlighted the use of medication in the context of everyday living; medicine education being considered a necessary aspect of everyday life. They also wrote:

“I think that today medicine education is very important, as medicines are easy to get and use. Medicine education is a part of pupils' everyday life.” Student10

Primary School Teachers' Role in Medicine Education

As future primary school teachers, students saw their role in medicine education as being quite minor, but still important. They pointed out that the role of the teacher, while being an important model for the proper use of medicines should, however, be neutral.

“It is quite an important role, but it does not easily come to the fore in teaching. However, we ourselves have not had any education in medicines, so how could we be expected to teach.” Student2

In group discussions, teacher students highlighted limited time resources, which might prove to be a restriction in the teaching of medicine education. They said that they didn't have enough time to prepare themselves for it.

Discussion

The primary school teacher students were well aware of the proper use of medicines as an issue in medicine education, but also highlighted discussion about the misuse of medicines; according to the aims and methods of medicine education, misuse should be avoided. Our results are mainly in accordance with the results of previous studies among teachers (see Hämeen-Anttila et al., 2006). Although our teacher students were also willing to teach about the use of medicines, they did not express how they would approach this, probably because they had had no experiences about medicine education from their own time at school. The teacher students considered medicine education to be an important part of health education in the context of biology; most of them thought that medicine education should be started in grades 4-6. Hämeen-Anttila et al. (2006) recommended that medicine education should start in the first grade. It is a challenge for medicine education to be so planned that teacher students get

a comprehensive picture of medicine education throughout their basic education at university and in teacher training.

Teacher students in this study did not highlight the role of parents in medicine education whereas in the study of Hämeen-Anttila et al. (2006) teachers highlighted the parents as having the main responsibility for teaching their children about medicines. This is also the aim of many health education programmes. Teacher students pointed out that school health nurses and other health care professionals could be considered responsible for teaching children about the use of medicines; the role of the school staff in medicine education was not emphasised which, according to Leurs et al. (2007), Speller et al. (2010), Guevél and Jourdan (2009) as well as Jourdan et al. (2010, 2011) is important. If in teacher education, the necessary support is to be given through relevant training and opportunities for developing professional skills regarding the principles and components of medicine education, conditions rendering it possible are even more essential. The health sector must move closer to the way schools work. These two sectors have to combine linking and integrating educational and health priorities in school life, considering the limited time available for various learning areas in the school settings (see, e.g. Cebotarenco & Bush, 2007; Leurs et al. 2007; Speller et al. 2010).

Teacher students' perceptions about the content of medicine education were quite limited. According to the study of Hämeen-Anttila et al. (2006), the incorrect use of medicines is a complex issue. Medicines can also be intentionally used incorrectly: the underuse of medicines, overuse of medicines, unnecessary use of medicines, use of the wrong medicines, the concomitant use of medicines, and the abuse of medicines. Teacher students' blog writings included no mention about the underuse of medicines, for example, the dose being too small, irregularly taken, or failure to take all the medicine prescribed. There was also no mention about the concomitant use of medicines. For example, teacher students highlighted the use of painkillers, mentioning that several of these can possibly cause stomach or other problems. Teacher students also did not mention the role of long-term illnesses in medicine education, however, they did have a good knowledge of flu and the headache.

In accordance with teachers in the previous study of Hämeen-Anttila et al. (2006) the teacher students wanted to teach children some principles about the use of medicines and encourage them to use medicines rationally and safely. Both teacher students and teachers highlighted that children should have knowledge about some medicines suitable for treating common symptoms. They also pointed out that it was good to educate children about the dangers relating to medicine use (see Bush & Hardon, 1990; Hämeen-Anttila et al., 2006). Results are also in accordance with the findings of Paakkari et al. (2010a, b) in which teacher students highlighted pupils' self-regulative knowledge and independent thinking during health education at school. **Also in the primary school curriculum, pupils were expected to take more responsibility for their own learning.**

As the teachers' own habits and attitudes concerning medicines will inevitably influence how they will react to medicine education (see Hämeen-Anttila et al., 2006), it is important for them to share their own perceptions about medicines, medicine education, and the role of the teacher in it. The shared blog which was used in this study is one choice of a way to share these perceptions. According to the results of this study, the teacher students did not highlight the pupil-centered view; this is not in accordance with the National curriculum, nor with previous studies concerning health education (see National core curriculum for basic education, 2004; Cebotarenco & Bush, 2007), nor with science teaching (see eg. Dumbrajs & Keinonen, 2008, 2009). One possible reason for this was that teacher students' personal experiences with medicine education were limited. Thus the challenge for teacher educators lies in providing students with personal experiences relating to medicine education teaching.

In the context of medicine education, a few teacher students mentioned critical thinking and searching for information. It is therefore important to evaluate information on the Internet that relates to medicine education, because the Internet also has the potential to provide the wrong information (see Gray et al., 2005). The quality of Internet-based medical information

is extremely variable; as there are no mandatory standards for peer review of the Websites, this makes it necessary to assess the credibility of health information found on the Internet. Evaluating the reliability of information sources on medicines should be highlighted in teacher education.

In this study, both the questionnaire and the blog writings were valuable as sources of information about teacher students' perceptions. The purpose of group discussions was to get further information to supplement the views highlighted in the questionnaire and blog writings. The blog writings especially enabled us to capture teacher students' own style of writing; gathering data which had been personally produced by the teacher students, using concepts that were familiar to them. Blog writings revealed teacher students' perceptions through their own individual ways of describing and interpreting medicine education and the role of the teacher in it. However, the perceptions found in all data were coherent, focusing on very similar issues. This study did bring to the debate on medicine education, an awareness of concrete pedagogical challenges. These results cannot be generalized but may be utilized in planning and implementing teacher students' further education. The results from this study will be useful to those who are concerned about health as well as medicine education. By developing good teaching and learning methods during teacher education, the importance of health and critical health literacy can be promoted. More experiences would be needed in order to gain a profound understanding of medicine education and the role of the teacher in it.

To increase the internal validity and authenticity in this study, the context was emphasized and the study design set in terms of the context in which the study was carried out. The plausibility and integrity of the research was made explicit by giving authentic data and interpreting this data in a transparent manner. The instruction for the blog writings was open, because the aim of data gathering was to find out those things which were significant for teacher students. The teacher students' perceptions were compared with many justifications, and interpretation was not based on only one of them (see Table 1). Open instructions may have had some influence in that even though the student experienced medicine education as being significant, he/she did not write about it. Group discussions were used only because it was possible that teacher students may have felt it essential to speak about some issues, but group discussions did not constitute the primary data. The benefit of open instruction was that it made it possible to use concepts which came "naturally" to them. The validity of research results was principally based on the process of data analysis.

Conclusions

This study indicated that primary school teacher students were not well familiarized with the pedagogical framework of medicine education. This was interesting, because previous studies concerning science education had indicated that new Finnish teachers had a modern view of science instruction; for example, the mention of inquiry as an essential learning method in science. This study led to some thoughts about the ratio between pedagogical knowledge and subject knowledge in education. To enhance future teachers' knowledge about medicines and medicine education, it is essential for teacher education to help students develop information seeking and critical thinking skills with regard to medicine education.

In Finland, medicine education is fragmented amongst environmental-and-nature-studies, physics and chemistry, biology and geography and health education. As such, there is a danger that all the essential topics are not being taught during the school years, thus failing to promote the well being and health of children in the best way. However, the main role focuses on the teachers, as it is they who are responsible for the choice of teaching methods. There is little knowledge about the methods and ways Finnish teachers provide health education on subjects concerning medicine education substances; these choices are important from the viewpoint of the pupils' values, attitudes and behavior. In the educational context, this research increased our knowledge by focusing on different kinds of learning materials; it has implications for teacher

training institutions not only in Finland but probably also in teacher education in other countries too. Consequently, these suggestions should be taken into account in developing work for primary school as well as the university curriculum.

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