Video-based feedback combined with reflective enquiry – An interactive model for movement awareness among nursing students

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ABSTRACT
The aim of this study is to describe an interactive model developed for movement awareness in a practical learning situation and to explore the use of video-based digital feedback and reflective enquiry in this model among nursing students. Sixteen students participated in individual interactive video sessions with a facilitator, who encouraged the students to reflect upon their own movements. Qualitative analysis showed that movement patterns were visualized, and that movement awareness and self-analysis were gradually developed. Encountering one’s own movement and reflecting on one’s own experiences appear to support motivation for movement changes.

Keywords
digital analysis, video feedback, movement analysis, qualitative research

INTRODUCTION
Feedback is known to be an important part of learning processes and can be provided in different ways (Boud & Molloy, 2013; Hattie & Timperley, 2007).
Video-based feedback has been widely used to support learning in education and professional development (Fukkink, Trienekens & Kramer, 2011), in sporting environments (Lauber & Keller, 2014; Nelson, Potrac & Groom, 2014), and is considered to be promising for health care practice and education (Crenshaw, 2012; Iedema et al., 2009). Augmented feedback, which entails supplementing additional information from an external source, is commonly used to support the learning of movement skills and has shown to be beneficial in athletes’ performance (Lauber & Keller, 2014). Augmented feedback can be focused on Knowledge of Result and Knowledge of Performance, where the latter focuses on the quality of movements and movement patterns (Schmidt & Lee, 2011). Solely using video feedback to support movement learning without any additional aid from either a reflecting partner or video modelling has, however, been shown to be relatively ineffective, and thus a combination has been suggested (ibid.). Video-based feedback can be used in various ways with different learning perspectives. It has, for example, been used in recalling a training activity in an interview situation as a basis for reflection (Johannesson, Silén, Kvist & Hult, 2013). In higher education, it has been used as a tool to provide the learner with feedback given by the teacher through screen-capture technology (Mathisen, 2012). Within the health care context, video recordings of in-action activities have been used to support reflection by providing feedback to the professionals during reflection meetings in groups together with a researcher. In this example, a group watched a DVD prepared with excerpts of their own in-action activities selected by the researcher (Carroll, Iedema & Kerridge, 2008; Crenshaw, 2012; Iedema et al., 2009). In other contexts, video feedback has been given to the learner on a DVD to watch alone at home with no support for reflection. Feedback on the individual’s performance captured in the DVD, and selected by the teacher, was later provided by the teacher/trainer to the learner (Charteris & Smardon, 2013; Noordman, van der Weijden & van Dulmen, 2014). In all these examples, no follow-up video recording was made to provide the participants/learners with possible improvements or encouragement for further changes and reflection. In a meta-analysis of 33 studies aiming to improve communication skills in professional practice, it was shown that video feedback was given to the participant approximately one week afterwards by the trainer in 55% of the studies. In 30% of the studies, the feedback was given together with others, and in 10% the participants watched the feedback alone. A follow-up recording was not made in any of these studies (Fukkink et al., 2011). Video feedback has thus an important role in various learning situations and is commonly used as a means for the learner’s own further interpretation, and is often conducted subsequently as a single event. To our knowledge, video feedback has seldom been used as an interactive tool in learning situations for encouraging an iterative process, and its use for furthering movement learning and awareness in an educational context is even less common.

The way we perform our movements during everyday activities is usually something we do unconsciously and automatically without thinking. Everyday movement patterns may, in different ways, entail an unnecessarily high load on
the musculoskeletal system, depending on how movements are performed. In demanding situations, such as repetitive or long-lasting activities this may be a risk for developing symptoms from the body’s muscles, joints and nerves, etc., termed musculoskeletal symptoms (Swedish Work Environment Authority, 2012; van den Heuvel, Ariëns, Boshuizen, Hoogendoorn & Bongers, 2004). The physical demands on health care professionals as well as health care students are high and entail a risk for developing musculoskeletal symptoms (Backåberg, Rask, Brunt & Gummesson, 2014; Ha, 2014; Karahan, Kav, Abbasoglu & Dogan, 2009; Mitchell, O’Sullivan, Burnett, Straker & Rudd, 2008). Several interventions to prevent musculoskeletal symptoms among health care professionals have been introduced, with unconvincing results; and multifactorial interventions have thus been recommended in the literature (Jaromi, Nemeth, Kranicz, Laczko & Bethlehem, 2012; Thomas & Thomas, 2014). The educational aspects in these interventions have not, however, been in focus, which might explain the insufficiently beneficial results. Modifying an ineffective or compensatory movement pattern and instead achieving a physically gentle and effective one requires a certain amount of movement awareness (Everett & Kell, 2010). In the present study, an interactive learning model has been developed as an attempt to support learning and movement awareness among nursing students.

The two aims of this study are thus 1) to describe an interactive model for movement awareness in a practical learning situation and 2) to explore the use of video-based digital feedback and reflective enquiry in this model among nursing students.

THE LEARNING MODEL

In this learning model for movement awareness, digital video feedback is used as an interactive tool to improve movement performance. The concept of interaction refers in this study to the interplay between humans and is viewed as the communication and exchange in an inter-personal interaction (Severin & Tankard, 2001), which may be supported by the use of interactive technology (Guðmundsdóttir, Dalaaker, Egeberg, Hatlevik & Tømte, 2013). The digital learning tool for movement analysis makes it possible to see and encounter one’s own movements and a role model’s movements, which act as the starting point for and support for reflection and interaction between the student and the facilitator [Fig. 1].
Figure 1. The interpersonal interaction with support of a digital analysis tool for movement analysis.

The video-based feedback is used individually during a session and the analysis and learning starts in the learner’s, and in this case the student’s, own experiences using reflective enquiry. This is in accordance with Boud & Molloy (2013), who suggest that active involvement by the learner in all aspects of feedback is beneficial for learning processes in general, as well as for encouraging and empowering the learner in his/her self-efficacy. The student gets the opportunity to refine the movements directly during the session by using video recordings and interaction with the facilitator, and thus receives instant feedback on the movement changes. This is supported by the digital video analysis in an iterative process, in which the student is able to determine the pace.

The sequences of the model are constructed with the intention to promote motivation in various ways. Ryan and Deci (2000) have described different types of motivation based on the self-determination theory (Deci & Ryan, 1985). Motivation can vary in the degree of autonomy, and the understanding of different types of motivation and how to facilitate them is important to support learning. Motivation that comes from within a person and is driven by an interest or enjoyment in the task itself is described as intrinsic motivation. Extrinsic motivation can be explained as oriented towards a separable outcome (Ryan & Deci, 2000).

In the model, the student’s reflection and the facilitator’s reflective approach are considered as central aspects for supporting learning (Ekebergh, 2007; Mann, Gordon & MacLeod, 2009; Schön, 1995). A lifeworld-perspective (Ekebergh, 2007) has influenced the reflective approach used in this model, which means that each individual is seen as a subjective lived body and his/her lived experiences are the starting point and guide the furthering process. The theory of observational learning (Bandura, 1986), which is defined here as learning through observation of one’s own and others’ movements, is a contributory concept to the learning model. A further contributory concept in the model to facilitate movement learning is the system of neurophysiological representation, which describes the internal structure of a movement performance...
containing, for example, sensory, motor and cognitive information (Elliott, Grierson, Hayes & Lyons, 2011). The analysis of the movement performances is in the model based on the concept of observational movement analysis, in which the understanding of human movements as initiated by force application against a surface is central (Hirschfeld, 2007; Everett & Kell, 2010). This also implies that the amount and direction of the application of force determine the quality of movement performance (Couillandre & Brenière, 2003; Hirschfeld, 2007), which is an important aspect for understanding variations in individual movement behaviour.

The learning model developed in this study comprises three main components: video feedback, video modelling and reflective enquiry, accomplished in repeated individual sessions over time, with so-called ‘spaced repetition’, which has been shown to enhance long-lasting learning (Logan, Castel, Haber & Viehman, 2012). The learning model also encompasses self-written diary notes and self-selected video recordings for home practise. The model was developed in collaboration with experienced clinical physiotherapists and minor adjustments were made after testing in a pilot study with five nursing students.

In the present model, three sessions with each participant within a four-month period were carried out, all in the same way, and adjusted to the learning process of each participant. In all sessions, the student was asked by the facilitator to perform pre-selected movements, initially without any instructions on how to do them. Each movement was video recorded and a computerized video analysis software program [Dartfish®] was used. This analytic tool provided instant feedback in a simple user-friendly way. It made it possible to watch the recordings at varying speeds and frame by frame in order to analyse the movement thoroughly and in detail. The students could also watch their own films side by side for comparison with their own previously recorded movements and with the recordings of a role model [video modelling] [Fig. 2]. The programme also made it possible to easily construct a personal ‘mediabook’ with self-selected recordings for home practise to send to the student.
The student and the facilitator watched the recordings directly after each performance and the same movement was carried out several times until the student grasped the core principles in the iterative process [Fig. 3], before moving on to the next movement. Three different movements were practised and the movements were chosen as being ordinary movements that could easily be integrated and adjusted to daily life movements. These movements were: starting to walk from a sitting position, climbing up and down a low step, and lifting a box from a chair to a table beside. The focus in the movement analysis was to gain an understanding of the quality of the movement performance based on the basic principles of ergonomic movement, which means the quality of the movement, movement initiation and force application. After analysing the student’s own movement several times, pre-recorded videos of a role model performing the same movement [video modelling] was presented to the student in order to provide an example of how the movement could be performed in an ergonomic way with efficient force application and low amount of musculoskeletal load, but not as the one and only correct way of performing the movement. The role models’ performance was used as a means to contrast ways of performing the movement. After each session, the student was invited to choose recordings to watch at home between the sessions and also to write reflections in a diary.
The facilitator in this project was a physiotherapist, who received instructions about and supervision on her role. The facilitator’s role was to enable interaction by continuously inviting the students to reflect on the movements and experiences in order to achieve a safe and flexible learning atmosphere. The student was thus put in the role of being the constructor of his/her own learning and understanding, which has been said to be supportive of learning (Boud & Molloy, 2013). The facilitator was open and flexible to the student’s thoughts, experiences and feelings, and the student’s previous experiences influenced the way in which the session was modified. In the present study the opening question when watching the first video recording was “What do you think of when you see your own movement on the video?” Reflective questions such as “What do you feel when you see your own movement?” opened for the students to also describe feelings and thoughts during the situation. Specific questions such as “Where do you start your movement from?” and/or “Which part of your body do you push with to get in motion?” were also commonly used. The facilitator followed up the questions by asking the student to explain more and to talk about his/her experiences.

**THE MODEL RELATED TO LEARNING THEORIES**

The development of the learning model was based on different learning and feedback theories. It was furthermore developed out of experiences from education and from clinical practice in collaboration with experienced physiotherapists. This might be considered to strengthen its relevance. It was tested and discussed in a pilot study and adjusted to its present version. In previous research, video feedback has been used as a one-way communication tool.
(Mathisen, 2012), as a base for reflection in a group (Carroll et al., 2008; Crenshaw, 2012; Iedema et al., 2009), or provided as feedback to watch alone at home. No other study was found using video-based feedback as an interactive tool to support an iterative learning process as in the present model. In the model, video-based feedback is combined with reflective enquiry, video modelling, diary writing, and self-selected video recordings for home practise. The model also entails spaced learning with repeated sessions, which has been said to be supportive of sustainable learning (Logan et al., 2012). The learning model thus encompasses several components that are adapted to the individual student. In previous research, the facilitator/trainer’s role is neither described nor emphasized. In the present model, the facilitator plays an important role in supporting the student’s own reflection, which is also shown in the results described later. The role is to facilitate the student in becoming the conductor of the learning process, and also to guide the student in visualizing details of importance in the movement pattern that may support understanding and awareness of movement. The facilitator’s competence and attitude are therefore crucial. As the reflection starts with and follows the student’s own experiences and thoughts, it reinforces an active involvement of the student and interpersonal interaction. Boud and Molloy (2013) maintain that being active and involved in the learning process contributes to sustained learning, which might imply that the learning model supports long-lasting learning; but that would need further research. Video feedback used in the health care context is often carried out in groups (Carroll et al., 2008; Iedema et al., 2009), which may have advantages, but when accomplished individually as in the present model it may provide the student with the possibility of a greater understanding of his/her own movements. Since the same kind of movement can be performed in very different ways, depending on individual differences, it may be beneficial for the analysis process to be carried out individually, as in the presented model.

**VIDEO FEEDBACK AND REFLECTIVE ENQUIRY IN THE LEARNING MODEL**

**Participants**

Nursing students at the end of the second and third years of study on a Bachelor of Science nursing programme in Sweden [105 students] were invited to participate. The recruitment was aimed purposively (Polit & Beck, 2004), and they received both written and verbal invitations. Twenty-one students volunteered to participate, five of whom withdrew prior to the beginning of the study. The mean age of the 16 participants was 24.9 years [range 21–39], and 15 of them were women. The students were invited to participate as a complement to the ordinary education in ergonomics in the nursing program; participation in the study was extra-curricular. Thirteen of the participants reported musculoskeletal symptoms during the past three months and all reported musculoskeletal symptoms during the past 12 months. Eight students reported that their symptoms impacted their general physical activity.
Data collection
The previously described learning model was used among the 16 participating students. For the present study, audio recordings from the first session were collected. The session took place in a specially arranged room in a health care training centre at the university and was carried out individually with each student.

Data analysis
The audio recordings were transcribed verbatim and analysed with qualitative content analysis as described by Graneheim and Lundman (2004) and Lundman & Graneheim (2012). The transcribed text was read as a whole to become familiar with the text and gain a sense of the whole. We inductively identified meaning units in accordance with the aim of the study, which were condensed and labelled with codes (Graneheim & Lundman, 2004). The analysis process went back and forth and different categorizations were tested. We also searched for and discussed the latent meaning based on the text in its whole and the categories; an overall theme and three sub-themes were formulated. The results were then discussed with all the authors, who are researchers, two with qualification as nurses and two as physiotherapists, and changes were made until consensus was reached (Lundman & Graneheim, 2012). During all the steps in the analysis process, our pre-understanding was continuously questioned and reflected on. Different possible interpretations were discussed among the group of researchers and in seminars with other researchers to make the designation of codes, categories and themes stringent.

Ethical considerations
Approval for the study was gained from the Regional Ethical Review Board in Linköping, Dnr: 2010/239-31. The students’ participation was voluntary and they were informed of their rights both verbally and in writing. The students gave their written informed consent prior to the first session. All data was treated confidentially. None of the authors was involved as examiners in the ordinary education for the students participating in the study and a person who was not a member of the research group was the facilitator in the sessions.

VIDEO FEEDBACK IN ACTION
The overall theme that captured the latent meaning of all the transcribed material of the audio-recordings was described as «Movement awareness and self-analysis increased by reflective enquiry based on students’ experiences when encountering their own movement through video feedback». The analysis resulted in three sub-themes; Students’ reflected visualization as a foundation for movement changes, Student experiences facilitate and obstruct movement changes, and Development of analysis through interpersonal interaction. The relationship between the theme and sub-themes is described together with the
six categories in Table 1. In the following text, the categories and sub-categories are described and exemplified with quotes under each sub-theme. An example of how the analysis process was carried out is shown in Table 2.

**TABLE 1. PRESENTATION OF THEME, SUB-THEMES, CATEGORIES AND SUB-CATEGORIES.**

<table>
<thead>
<tr>
<th>Theme</th>
<th>Movement awareness and self-analysis increased by reflective inquiry based on students’ experiences when encountering their own movement through video feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-themes</td>
<td>Students’ reflected visualization as a foundation for movement changes</td>
</tr>
<tr>
<td>Categories</td>
<td>Cognitive visualization of bodily details in movements</td>
</tr>
<tr>
<td>Sub-categories</td>
<td>Identify details in postural control, coordination and load distribution</td>
</tr>
</tbody>
</table>

**TABLE 2. EXAMPLE OF THE QUALITATIVE CONTENT ANALYSIS PROCESS.**

<table>
<thead>
<tr>
<th>Category</th>
<th>Interaction between feelings and thoughts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-categories</td>
<td>Cognitive agreement Contradiction</td>
</tr>
<tr>
<td>Code</td>
<td>Visual appearance and experiencing congruence Thoughts disturb the movement</td>
</tr>
<tr>
<td>Meaning unit</td>
<td>The student describes the experience of the physical movement and the visual impression being in agreement The student describes that too many thoughts create uncertainty in the movement.</td>
</tr>
</tbody>
</table>

**Students’ reflected visualization as a foundation for movement changes**

When encountering one’s own movements through the video feedback and when comparing with the role model, the students visualized different aspects of the movement quality directly after each performance. The dialogue with the facilitator stimulated reflection upon the visual appearance and thus the students’ awareness of their own movements was raised. During the session, adjustments in their movement pattern were made based on these reflections.
Cognitive visualization of bodily details in movements
When encountering their own movement on the screen, the students described details and adjustments in the movement and the body posture that are not usually reflected upon. Adjustments in their own movements related to the force application against the floor were identified during the session, as well as adjustments in load distribution and movement coordination. The students also identified exaggerated movements when they encountered their own movements.

Self-awareness through detachment
When encountering the video recordings of their own movements, in comparison with those of the role model, the students assessed their own movement, thus providing a clearer understanding of how the movement could be adjusted. This self-awareness was developed through a process of instant detachment provided by the video feedback and the analysis was made not only based on the experience of the movement but also through the "objectification" of that movement. The students confirmed their own movement through self-feedback and assessed details in movement behaviour that they wanted to refine. By visualizing and verbalizing adjustments and improvements in movement from one performance to another, the students gave themselves positive feedback.

Getting up looks actually worse in the first picture … it really looks quite heavy … it looks much easier … I start much more easily with that movement … I lean forward a little ... a bit more prepared ... I have to stand first and then walk. (IP10)

Student experiences facilitate and obstruct movement changes
The students were continuously encouraged to reflect upon experiences of changing their own movement in the learning situation. The students expressed positive feelings connected to the learning situation, and there was agreement between what the students saw and what they experienced. However, they also spoke of experiences of feeling discomfort, and that it was difficult to analyse and to adjust in the way they desired.

Interaction between feelings and thoughts
When encountering their own movements, the students expressed in different ways how the physical movement harmonized with the visual presentation of the performed movements in the video recordings. The students thus received confirmation of the adjustment of movement by seeing the movement itself. When the performances in the video recordings did not harmonize with the experience, it could encourage the students to improve further. It could also provide information that the unaccustomed, exaggerated feeling of the movement did not look so strange in the video recordings. In the learning situation,
the students described a sensation of desiring to do one thing while the body does another.

It feels as though I’m trying to compensate for something on the way down ... I jerk a little or something like that ... my mind wants me to move forward but my body is so used to doing it so it automatically goes backward ... I don’t know if it’s to do with balance or not but it looks like it actually. (IP3)

The students described the learning process as being difficult, both in the analysis and the verbalization of the movement. It could also be difficult to be able to know and feel in the body how the movement should be performed, and also to refine the movement towards the goal. Increased concentration and focus on one part of the body or changing one part of the movement can affect the performance of the movement in its entirety.

Well ... I don’t actually know ... I focus so much on my feet and legs now so the lift was a little worse ... but I’m not sure. (IP10)

**Experiences of change**

In the learning situation, the students spoke of adjustments in their movement patterns as being positive, giving more strength, more flow, a lighter and smoother movement and the movement and body becoming less heavy.

It (the movement) looks easier ... 15 kilos less just due to walking right. (IP11)

Several feelings could be experienced at the same time and might be contrasting. The students spoke, for example, of it being good to be able to see their own movement but also that it felt unpleasant looking at oneself. An improved movement could be uncomfortable because of a sense of unfamiliarity. The new, refined movement might be experienced as unnatural and uncomfortable. Discomfort in one part of the body might be experienced as a signal that the movement was performed in an unsuitable way, thus highlighting the need for refining the movement.

Yes ... it feels ... quite good ... a little uncomfortable because one thinks of everything that one has to do and then ... but it feels better although I still feel that I twist my back. (IP9)

**Development of analysis through interpersonal interaction**

Initially the students gained a spontaneous visualization of the movement in its entirety. Through the interaction with the facilitator, the students’ analysis was gradually developed, and details and underlying causes, which were not commented on at the beginning of the reflective process were observed and better understood. They also gradually commented on their own on what needed to be improved in their own movements.
Reflective facilitation

The facilitator’s way of stimulating the students’ own reflection and taking the students’ previous experience into consideration supported and guided the students in detecting and visualizing their own movement patterns. When comparing with the students’ previous recordings during the session and with those of the role model, the facilitator assisted the students to reflect upon differences and alternative ways of movement, but also to describe and reflect upon experiences and thoughts. By guiding the students to alternate focus between parts of the movement and the movement in its entirety, the facilitator aimed to stimulate further reflections. When the students lost confidence in their reflective ability, the facilitator guided the students in the dialogue to see details that they could not identify on their own. The facilitator supported the students in focusing on the positive aspects in the adjustment and learning process. The facilitator’s open questions invited the students to reflect further regarding details in their individual movement.

Analysis of movement

Watching one’s own movement and a role model performing the same type of movement created an opportunity for the students to analyze and describe in their own words the differences and/or similarities they saw. Combined with guidance from the facilitator the students could formulate in their own words possible alternatives for the movement in order to improve it and gradually develop the analysis.

Oh I see ... she (the role model) transfers her body weight/.../ I probably need more power in my movements than she/.../ so I should perhaps stand closer as she does, that she has her foot there and then just ... (IP13)

When encountering their own movements in comparison to that of the role model and supported by reflective inquiries, the students also gained opportunities to analyze and identify potential risks for future load-related injuries and
symptoms in their current way of moving. They could also identify possible explanations for the differences in movement such as body composition, force application against the ground, distance and placement in the room.

Mm … that depends on how long one is in various parts of one’s body and also for positioning your centre of gravity in the right place /…/ she has a lower centre of gravity (IP14)

DISCUSSION

In this study an interactive model for movement awareness has, for the first time, been described and studied. The model contains well-known elements for supporting learning, such as video feedback, video modelling, spaced learning, interpersonal interaction and reflection. The unique qualities of this model are how these elements are used and combined in a learning situation for movement awareness together with the theoretical underpinnings that pervade the approach to learning. The digital video analysis tool was used as an interactive tool and its functions, for example, being able to see recordings at different speeds, side-by-side and frame-by-frame, provided individual feedback to the students on their movement performance in an easy and flexible way. The digital analysis software also made it easy to distribute recordings to the students for home practise. Interaction does not occur automatically when using interactive technology, as maintained by Guðmundsdóttir et al. (2014). The facilitator’s role and approach in this iterative process has thus been emphasized in order to facilitate the student in reflecting on his/her own movements and to enable interpersonal interaction. This means that the movement analysis and learning process start with and follow the student’s experiences. The results from this study, which are derived from audio recordings from the first of three sessions, contribute to the understanding of what happens in interpersonal interaction in a movement learning situation where video feedback, video modelling and reflection are combined and used. This knowledge is important in the development of educational aspects to promote movement awareness and learning in different contexts; one example is within the field of ergonomic interventions.

The model was used among nursing students in a practical learning situation. The results show that movement awareness and self-analysis were increased by reflective enquiry based on students’ experiences when encountering one’s own movement through video feedback. The detachment provided by being able to watch one’s own movement on the screen and to compare it with recordings of a role model (video modelling), helped the students to become conscious of details that had not been reflected upon previously, which can develop their movement awareness. They were also able to see details in their movement patterns that could cause their symptoms or would be likely to give them symptoms or pain in their future. This could be interpreted as supporting intrinsic motivation, as it concerns a development of their understanding of how the quality of their own movements can impact their well-being and to prevent future load-
related problems. The increased awareness could, however, also be seen as supporting one type of extrinsic motivation, as there is a potential future reward for the student, and as Ryan and Deci (2000) suggest, there can also be a fluctuation between different types of motivation depending upon situational factors and previous individual experiences. The focus of visualizing movement initiation and force application in both one’s own movement and that of the role model may support the students in understanding and explaining the movement performance. Understanding underlying aspects has been suggested as being supportive in a changing and learning process (Bandura, 1986). When the students identified not only what needed to be changed but also the underlying causes of the quality of the movements and possible symptoms, it could be seen as a sign of the student’s entering what Argyris and Schön (1995) has described as a double-loop learning process, which these authors maintain supports learning.

Encountering one’s own movement through video feedback, in combination with the reflective enquiry, helped the students to experience the movement in a different way. The experiences could, on the one hand, facilitate the process of change when there was agreement between the video recordings and the experience of the movement, or when the movement did not look as strange in the video recordings as the students had experienced it. The video recordings could, on the other hand, affect movement changes, and the students expressed that when they thought too much of one part of the body, it made it harder to accomplish a smooth and effective movement. Sometimes the students expressed that the performances in the video recordings did not agree with their feelings of the movement. This might be confusing but could also be encouraging for the students to improve further.

The students’ reflection regarding details, experiences and possible adjustments was supported by the interaction between the facilitator and the students, and the reflective enquiry had an important role in the students’ involvement and active role in the learning. The students’ level of analysis was gradually extended and developed through the facilitator’s role in supporting the students in alternating focus, which is exemplified in the last quotation. The results show that the reflective enquiry encouraged the students’ ‘thinking aloud’ which supported their analysis of what was good in their behaviour and what needed to be changed. The students’ thinking aloud also made it possible for the facilitator to follow and further the students’ own reflection and self-analysis process through interaction. The students’ active involvement in the learning situation might also contribute to stimulating a self-driven process of change, which is also said to enhance intrinsic motivation (Boud & Molloy, 2013; Ryan & Deci, 2000). The students expressed that the experience and the recordings sometimes concurred, which implies a direct confirmation of their impression of their own performance. When the students received positive feedback it could contribute to supporting motivation and self-esteem, which Whitehead & Corbin (1997) have maintained are closely interlinked with each other. This is essential, as self-esteem has been shown to be an important factor for nursing students’ mental wellbeing (Ni et al., 2010).
Methodological considerations

The majority of the participating students reported musculoskeletal symptoms that impact their daily life activities, which might be a sign that the students with a history of musculoskeletal symptoms saw an opportunity to know more about their present or previous symptoms. This might possibly have influenced the result, as the students might have already been well motivated and probably had an interest in gaining more knowledge about their movements in relation to their symptoms. The self-reported prevalence and impact of musculoskeletal symptoms among the study population did not, however, differ significantly in comparison with undergraduate nursing students at the same university, based on data from a previous study (Backåberg et al., 2014).

Qualitative content analysis as described by Graneheim and Lundman (2004) and Lundman and Graneheim (2012) was chosen in order to identify variations in similarities and differences and to search for the manifest content as well as the latent meaning of the collected data. None of the authors was involved in the performance of the intervention, which strengthens both the credibility and confirmability of the study (Polit & Beck, 2004). The material was presented and discussed in a research seminar with other colleagues and valuable comments were obtained. The analysis process was continuously checked between two of the authors, one physiotherapist and one nurse, and all authors were involved in the compilation of the manuscript. As this is a model for movement awareness and learning, it could be considered that the findings can be transferred to other contexts where movement awareness and changes in movement patterns are desired.

Implications

The use of a video-based digital analysis tool individually and in combination with reflective enquiry as in the developed and studied learning model, appears to encourage an active involvement in the learning process for understanding and developing awareness of one’s own movements. This learning aspect may be important in various practical learning situations to stimulate awareness and refine movement behaviour. This knowledge could, for example, be a valuable contribution to the planning and accomplishment of ergonomic interventions in health care education by encompassing this perspective when educating health care students to remain healthy in their future careers.

CONCLUSION

In summary, this study’s contribution to the current body of knowledge is:

– A learning model that is supported by a video-based digital analysis tool can facilitate the development of movement awareness and self-analysis and can encourage interpersonal interactivity.
- A greater understanding of the interactive process between a student and a facilitator when using the video-based digital analysis tool and how this tool can support reflection.

- A greater understanding of the importance of an open and flexible approach and use of reflective enquiry and guidance when encountering one’s own movement for motivating movement changes.

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DECLARATION OF INTEREST

The authors declare no potential conflicts of interests.

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