



# Professional values, technology and future health care: The view of health care professionals in The Netherlands



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## ABSTRACT

Perceptions and values of care professionals are critical in successfully implementing technology in health care. The aim of this study was threefold: (1) to explore the main values of health care professionals, (2) to investigate the perceived influence of the technologies regarding these values, and (3) the accumulated views of care professionals with respect to the use of technology in the future. In total, 51 professionals were interviewed. Interpretative phenomenological analysis was applied. All care professionals highly valued being able to satisfy the needs of their care recipients. Mutual inter-collegial respect and appreciation of supervisors was also highly cherished. The opportunity to work in a careful manner was another important value. Conditions for the successful implementation of technology involved reliability of the technology at hand, training with team members in the practical use of new technology, and the availability of a help desk. Views regarding the future of health care were mainly related to financial cut backs and with a lower availability of staff. Interestingly, no spontaneous thoughts about the role of new technology were part of these views. It can be concluded that professionals need support in relating technological solutions to care recipients' needs. The role of health care organisations, including technological expertise, can be crucial here.

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## 1. Introduction

Because of the increasing number of older individuals and a higher prevalence of chronic medical conditions [1], care utilisation and health care expenditure have risen considerably in recent decades [2]. Consequently, smart solutions to overcome or decrease health care expenditure are of utmost importance. The use of health care

technology is regarded as a possible solution to meet these current and future challenges. Much effort, for instance, in European projects, is being made to financially support initiatives [3].

Nurses have a long tradition for using technologies and medical technical aids have made their way into care, mostly in clinical settings. In the late nineties and beginning of this millennium also telecare rose. It started with home electronics, mostly alarm devices such as smoke, gas or flood detection. Along came more specific devices for the guiding and monitoring of patients, such as fall detectors, pressure mats and door alerts [4]. Doctors are these days able to monitor patients from a distance, for example their heart conditions with sensor technology. Together with the

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evolving opportunities of technology at lower costs, such as video interaction between care provider and patient, the vocabulary from home electronics and telemedicine changed into broader terms like telehealth or ehealth [5].

Despite the rapidly increased investments and the relatively long tradition of using technology in care, the widespread and routine use of technology in chronic health care is still rather disappointing [6]. One of the reasons that has been brought forward, regards the involvement of many different stakeholders, including care recipients, health care professionals, engineers, policy makers, and managers in chronic health care [7]. Professionals providing care, and care recipients receiving care (within the domain of health care also referred to as patients, clients or residents), can be considered key figures in the implementation and use of technology. Factors attributable to technology acceptance barriers, both in health care professionals [7–9], and in care recipients [10], have been distinguished which explain why technology implementation has not always been successful.

For the understanding of technology acceptance, several models are available. Literature is dominated by the Technology Acceptance Model (TAM) [11] and the Unified Theory of Acceptance and Use of Technology (UTAUT) [12]. TAM focuses on the intention to accept technology. This model is widely used as the theoretical basis for many studies of user technology acceptance, and was developed for the specific domain of human–computer interactions [13]. The model is used to predict the attitudes and behaviour of users of technologies, based on two key variables: perceived usefulness (PU) and perceived ease of use (PEOU). PU is the individual's perception that using the technology (for instance, ehealth) will enhance job performance, and PEOU is the individual's perception that using the technology will be free of effort [11]. These two variables explain 40 percent of an individual's intention to use a technology in a variety of contexts, including health care [13].

Although TAM proved to be useful in predicting, and perhaps explaining, care professional's acceptance and use of health technology, there is room for improvement [13]. The UTAUT is a technology acceptance model formulated by Venkatesh et al. [12]. Compared to TAM, the construct of 'intention to use' is expanded in UTAUT. The UTAUT gives more insight in user intentions by adding two additional variables: social influence and facilitating conditions. The theory contains four key constructs for acceptance (i.e., performance expectancy, effort expectancy, social influence, and facilitating conditions), which are direct determinants of usage intention and behaviour. Moreover, gender, age, experience, and voluntariness of use are postulated to moderate the impact of the four key constructs on usage intention and behaviour [12]. Validation by Venkatesh et al. of UTAUT in a longitudinal study found it to account for an impressive 70% of the variance in behavioural intention to use [12].

All these studies and models of acceptance of technology in health care, do not consider the professional values and the relationship of these values to the actual use of technology. Moreover, Most of the technologies care professionals have to use, are not voluntary. Innovations, like

health care technology, which are compatible with values, organizational or professional standards and perceived needs are, in general, more readily used by the care professionals [14]. Therefore, a more subtle explanation of one of these alleged reasons, i.e., professional values and standards, is needed.

There are several trends in health care that point into a profound change in roles of health care professionals, closely related to their professional values. Especially in the treatment of chronic diseases, this is an important issue. One such trend is that patients have more access to health information and participate in care decisions [15]. A related issue is that responsibility of informal care has become more important [16]. Technology supports these developments and therefore can be disruptive [17]. In other studies, it has indeed been suggested that care professionals are afraid that their roles as care providers might become redundant because of the use of technology [18]. Furthermore, technology, as compared to conventional and personal care, is often thought of as 'cold' versus 'warm' care [19]. In other words, care professionals might nourish professional values and moral attitudes, which might, in turn, intuitively influence use of technology. If these values are in conflict with the use of the technology at hand, implementation might become less successful.

In studies on job satisfaction in health care professionals, these values also proved to play an important role. For instance, one of the determinants known to be strongly related to professional values and job satisfaction in care professionals, is their patient orientation [20]. In studies addressing patient-centred interventions, job satisfaction of care professionals increased when individual care recipients' needs were met in a favourable manner [21]. Barnard [22] explains that technology can pose conflicting demands on nurses while attending to these needs, for instance, because medical alarms and intravenous pumps or telephones require immediate action, even while spending valuable time with another patient.

Unfortunately, the majority of studies regarding the successful implementation and use of technology has been focused on specific technologies; e.g. the use of telemonitoring systems [23]. To our knowledge, no study has yet investigated the views and ideas of care professionals regarding the implementation and use of technology as a whole; i.e., without focussing on one or more specific technologies. By not focussing on specific technologies per se, but on technology as a whole, a more in-depth view for the rather disappointing implementation of technology in health care is given. Moreover, a broader inquiry of important values regarding technology, the experiences hereof, and the perspective of technology in future health care can be provided. Therefore, the aim of this study was threefold: (1) to explore the main values of care professionals in several health care settings and several levels of technology implementation, (2) to investigate the perceived influence of the technologies regarding these values, and (3) the accumulate views of care professionals with respect to (the use of technology in) the future.

## 2. Methodology

### 2.1. Design

A qualitative interpretive approach with open and semi-structured interviews was used.

### 2.2. Participants

Fifty one health care professionals in several health care settings in The Netherlands were interviewed. Participants were recruited from eight different institutes, giving care to a wide variety of health care recipients (including children and adults with physical and mental limitations, psychiatric care recipients, care home and nursing home residents). Participants were contacted by their team manager. All potential participants accepted the invitation. Each interview lasted 45 min to 1 h. Interviews were held between January 2010 and June 2012, at the working site of the participants. The participant selection aimed at variety in age, working experience and technology use [12]. There were no further exclusion criteria. Interviews were held at times considered convenient for participants, most of the time at the start or end of a shift. In all but one setting (focus group), individual interviews were applied. Details are given in Table 1.

### 2.3. Data collection- and analyses

Participants were first contacted by their team manager, and received written information about the study. After informed consent, they were contacted by the researchers. At all times, one interviewer and one observant were present. Background information (for instance, gender, age, setting, work experience) was collected for insight in data variation of the respondents (Table 1). During the interviews, open and semi-structured methods were used. All interviews started with an open part, inviting participants to talk freely about their work. Topics included in the semi-structured part of the interview were (1) covering professional values, (2) (examples of) technology use, experience and problems encountered, and (3) considerations about the view on future health care. In subsequent interviews, topic lists were adjusted if new topics evolved.

Interviews were recorded and completely transcribed. Each transcript was read and analysed by at least two researchers. Codes were attributed to relevant text fragments by two or more researchers and were subsequently compared and discussed (open coding). Each transcript was coded independently by two researchers, who subsequently had to come to an agreement. In case of disagreement, a third researcher was consulted. After that, codes were grouped into categories and themes [24]. Summaries

**Table 1**  
Characteristics of participating institutions and care professionals.

	Clinical roles (n)	Type of institution	Type of technology used	Age range	Sex (F/m)	Method
1.	Care professionals and nursing assistants (4)	Care home	Personal emergency response systems (neck-worn pendants) Motion sensors Combined nurse alarm- and intercom system	43–56	(4/0)	Focus group
2.	Care professionals and nursing assistants (6), team manager (1)	Home care for persons with acquired brain injury	Hoist	20–60	(5/2)	Individual interviews
3.	Care professionals (4) and nursing assistants (4)	Home care	Personal emergency response systems (neck-worn pendants) Motion sensors Combined nurse alarm and intercom system Video communication system (VieDome®)	30–55	(8/0)	Individual interviews
4.	Nursing assistants (6) Team manager (1) Occupational therapist (1)	Day care for persons with mental and physical impairments	Hoist Security alarm system	24–62	(6/2)	Individual interviews
5.	Team manager (1), nursing assistants (6), case manager (1)	Care for persons with mental impairments	Hoist Security alarm system Personal emergency response systems (neck-worn pendants) Nurse call system with call back feature to connect to resident after receiving call	22–50	(8/0)	Individual interviews
6.	Nursing assistants (8)	Guest house for children with multiple impairments	Cameras in the hallway Door alerts Intercom system with call back feature to connect to resident after receiving call	22–54	(5/3)	Individual interviews
7.	Care professionals and nursing assistants (6) Case manager (2)	Psychiatric care	Hoist Intercom system with call back feature to connect to resident after receiving call Electronic patient report	25–58	(7/1)	Individual interviews

of the transcripts were mailed to all respondents for member check purposes.

In this study, results from individual health care settings were pooled, which yielded general themes and categories applicable to all settings.

### 3. Results

The range of technology used in the eight health care settings varied. The age range was large and both more and less experienced participants were included. The majority of respondents were female (Table 1). Themes, categories and corresponding quotes are described in Table 2.

#### 3.1. Professional values

All care professionals mentioned that their main value was being able to contribute to the well-being of their care recipients. Human interaction and satisfied care recipients, is most important for them: "... If the patient is satisfied, I am satisfied" [6].<sup>1</sup> "...The things I experience from the care recipients contribute the most to my satisfaction ..." [4], "... I really enjoy getting a compliment from the care recipients I care for ..." [4] "I enjoy working with people, to be able to do something for them. Being able to support clients in their daily living activities" [5]. "People often take it for granted that during the day many people are walking around here, but they find it a bit special that we stay up late for them" [1].

The second most important value mentioned was working together in a supportive and fixed-duration team. Care professionals highly value feedback from their team members and to experience mutual respect. Moreover, appreciation of their work by their team manager, is also highly valued: "...most important is: a good team, a nice team manager, good supportive aids and a good schedule ..." [5]. "... in teams with many temporary staff members, work load is increased ..." "... working together with colleagues for me is very important to improve the quality of care ..." [5]. "... I think it is good to be able to talk to other colleagues about to what they bump into. That is most important, though not everybody thinks this is already happening sufficiently ..." [2]. "... I think it is important to be able to communicate [with colleagues], to be able to 'talk it off', have colleagues to share [problems] with" [3]. "Even if the work load is very high there is no problem when the atmosphere is good." [5]. "I have worked in this department with the same colleagues for about ten years now. So we are responding well to each other. If there is something wrong, we talk about that ..." [2]. [another employee]: "The co-operation is not always good because there are several temporary employees; it takes time before a new procedure is known by everyone" [2].

#### 3.2. Perceived influence of technology

The use of technology in the studied health care settings varied between settings. Some settings only used relatively

simple technologies (for instance, passive hoists and emergency response systems [5]), while others used advanced telehealth communication systems [3]. Most professionals appreciated the use of technology as supportive for their daily activities. "The tools we use in the residence are seen by everyone as a support and totally not as a replacement for care because personal care and guidance are actually very important to the residents and technology cannot replace us". [5]).

Five aspects proved to be important for perceived success of technology. First, technology was appreciated if professional values were respected (not compromised) by the use of technology. In some settings, technology contributed unintentionally to professional values in a favourable manner: "If I'm working with a hoist, I try to see if I can make eye contact with someone who's in the hoist and yes, then the most important and intimate conversations take place" [4]. Technology can also support team work, which is considered an important aspect: "For example it would be nice if you communicated more and looked at each other with those cameras, then you would get better understanding for one another. (In other words: even the care centre and base personnel must act like a team)" [6]. Another value that was mentioned and could be favourably influenced by the use of technology was being able to manage responsibilities of the professional. For instance, by using sensor technology, care professionals are able to prioritize their activities in a large ward: "When I get two alarms at the same time, I can see what is most urgent, and communicate this to the resident who has to wait a little longer" [this quote was confirmed by all participants of the focus group] [1].

Secondly, professionals underlined the importance of tailor made solutions. Not every resident needs the same technological solution: "I've already seen twice that they [workers at a health care call centre] communicate with the intercom. Well really, the children were terribly shaken. For them they perceive a voice coming out of nowhere. That is very threatening. It echoes in the room and the very loud sound comes out of the wall" [6]. "We just have new buildings and everyone got the same intercom. But some people cannot even reach the button of the intercom from their wheelchairs!" [2].

Thirdly, care professionals highly value appropriate information and training about new technology. "When a new assistive aid is ordered, we are informed by the manufacturer. If something is unclear, we can consult the physiotherapist. This works well. When the bath hoist was introduced, no instruction was given. Therefore, we did not know how to use it" [5]. "If you have missed the instruction, the colleagues help you to be able to use it properly" [2].

Fourth, reliability of technology (and the availability of a help desk), is also considered important: "The question is does the system work, and can I rely on the system? Are the telephone lines ok and does the Internet work?" [6]. "Then there is a new technology and that's just not the right solution. I think that is a pity that it does not work properly right away" [2]. "It is not always clear which information you get and later, by the time when I read it, there is no one that you can consult [3].

Finally, care professionals stressed the importance of evaluating and fine-tuning the implementation of

<sup>1</sup> Figures between brackets refer to the institutions (Table 1).

**Table 2**

Results represented as themes, categories and quotes related to professional values, technology and future of health care.

Themes	Categories	Quotes
Professional values	Contributing to well-being of care recipients	<p>“If the patient is satisfied, I am satisfied” [6].</p> <p>“... most of my satisfaction, that is what I experience from the care recipients ...” [4].</p> <p>“... I really enjoy getting a compliment from the care recipients I care for ...” [4].</p> <p>“I enjoy working with people, to be able to do something for them. Being able to support clients in their activities of daily living” [5].</p> <p>“People often take it for granted that during the day many people are walking around here, but they find it a bit special that we stay up late for them” [1].</p>
	Working together in a supportive and fixed-duration team	<p>“... most important is: a good team, a nice team manager, good supportive aids and a good schedule ...” [5].</p> <p>“... in teams with many temporary staff members, work load is increased ...”</p> <p>“... working together with colleagues for me is very important to improve the quality of care ...” [5].</p> <p>“... I think it is good to be able to talk to other colleagues about to what they bump into. That is most important, only, not everybody thinks this is already happening sufficiently ...” [2].</p> <p>“... I think it is important to be able to communicate [with colleagues], to be able to ‘talk I toff’, have colleagues to share [problems] with” [3].</p> <p>“Even if the work load is very high, if the atmosphere is good, there is no problem” [5].</p> <p>“I work in this department with the same colleagues for about ten years now. So we are responding well to each other. If there is something wrong, we talk about that ...” [2].</p> <p>[another employee]: “The co-operation is not always good because there are several temporary employees, it takes much time before a new procedure is known by everyone” [2].</p>
Perceived influence of technology	Technology respects professional values (interaction care recipient, team work, manage responsibility)	<p>“If I’m working with a hoist, I try to see if I can make eye contact with someone who’s in the hoist and yes, then the most important and intimate conversations take place” [4].</p> <p>“It would be nice, for example, with those cameras that you communicate more and have a look at each other, so you get more understanding for one another” [6].</p>
	Importance of tailor-made solutions.	<p>“When I get two alarms at the same time, I can see what is most urgent, and communicate this to the resident who has to wait a little longer” [1].</p> <p>“I’ve already seen twice that they [workers at a health care call centre] communicate with the intercom. Well really, the children were terribly shaken. For them they perceive a voice out of nowhere. That is very threatening. It echoes in the room and the sound comes out of the wall very loudly” [6].</p> <p>“We just have new buildings here and everyone got the same intercom. But some cannot even reach the button of the intercom from their wheelchairs!” [2].</p>
	Appropriate information and training in regard of new technology	<p>“When a new assistive aid is ordered, we are informed by the manufacturer. If something is unclear, we can consult the physiotherapist. This works well. When the bath hoist was introduced, no instruction was given, and, therefore, we did not know how to use it” [5].</p> <p>“If you have missed the instruction, the colleagues help you to be able to use it properly” [2].</p>
	Reliability of technology (and the availability of a help desk)	<p>“The question is does the system work, and can I rely on the system? Are the telephone lines ok and does the Internet work?” [6].</p> <p>“Then there is a new technology and that’s just not the right solution. I think that is a pity that it does not work properly right away” [2].</p> <p>“It is not always clear which information you get and later, by the time when I read it, there is no one that you can consult [3].</p>
	Evaluating and fine-tuning the implementation of technology	<p>“The way the organisation has dealt with our points of criticisms of employees have caused that we can work with the system properly now. We have experienced this as very pleasant and we felt involved in this process” [7].</p>
The future of healthcare	Opportunity or possibility of technology in work	<p>“I think that as a result of cuts [in health care] in the future we get less time for our work. There will probably be drop-off hours and, for instance, in helping the client in the morning. We have to do the same job in less time, and, therefore, have less time to spend with the client and we can give them less attention” [5].</p> <p>“I think there will be more technology in healthcare. I also think staff are going to do other work. I also think healthcare is becoming less personal. The carers are the special ones who must be there for the clients. I don’t like this development... at the same time I would say that it is impossible that technology replaces our work” [5].</p>



technology: “We can work with the system properly now that the organisation has dealt with our points of criticism and we are pleased to have been involved in the process.” [7].

### 3.3. *The future of health care*

Although participants in general valued the technology they already use and have ideas about optimal implementation, they do not consider technology as an opportunity or possibility when thinking about the future of their work. When asked about expected developments in health care, they expect more care recipients, less personnel and, as a result thereof, less personal contact. All together, they have bleak expectations of the future of care. “I think that as a result of cuts [in health care] in the future we get less time for our work. There will probably be drop-off hours and, for instance, in helping the client in the morning. We have to do the same job in less time and therefore have less time to spend with the client and we can give them less attention” [5]. “I think there will be more technology in health care. Staff are going to do other work and health care is becoming less personal. The caregivers are the special ones who must be there for the clients. I don't like this development... at the same time I would say that it is impossible that technology replaces our work” [5].

## 4. Discussion

The main values of health care professionals in several health care settings with various uses of technology, were being able to contribute to the well-being of their care recipients and to work in a supportive team. Technology in general was not experienced as compromising professional values, but the implementation was considered more successful if technology was tailor-made, if proper training was given, if technology was sufficiently reliable and if care professionals were involved in the implementation process and fine-tuning of the technology. On the other hand, when thinking about the future of care, technology did not play a role in a way that it could be supportive.

On first glance, some of the results appear to be contradictory. There seems to be a remarkable gap between the positive attitude with respect to the use of technology by care professionals, and their perceived perspective of the future. Most care professionals value the use of technology, and do not experience many conflicts with professional values. This is in agreement with literature [14]. On the other hand, health care professionals see technology as a future threat and do not think spontaneously of technological opportunities to support future challenges and increases in work load. It may be possible that care professionals have difficulties in translating needs into technological solutions. Moreover, the technological possibilities are numerous, and most of these possibilities are unknown to care professionals. Developments in the domain of technology are exponential and therefore keeping oneself informed about these developments, is almost impossible. At the same time, there is a shortage with respect to the use and possibilities of technology in most of the educational curricula of health care

professionals, which further broadens the distance between the delivery of care and the use of technology. The National League of Nursing therefore states that ‘nurses of the 21st century need to be skilled in the use of computer technology’ [25]. However, being educated with today's technologies, is not sufficient to be able to deal with tomorrow's. The main issue to be dealt with, is how to be educated as a ‘future proof’ care professional. This implies the development of the ability to think of technological possibilities, without the need to be already familiar with them. In practice, this implies being able to work together with engineers and to engage in co-creation and co-purchasing activities. Whereas care professionals are able to express health-related needs or health problems, technicians can contribute by making suggestions of technological options, and together tailor-made solutions can be developed. Engineers will be important professionals in future health care and the main challenge is to bring the cultures of care and technology together.

At this moment, engineers do not have a prominent role in decision making processes. Therefore, in order to implement technology in current health care processes, an organisation's management team plays an important role. Whereas health care professionals are experts in expressing the needs of their patients, managers can be helpful in relating these needs to technological possibilities. This process still needs to be evaluated and fine-tuned, involving all stakeholders. In the diagram of Fig. 1, this process is shown.

As our results also show, another important aspect of successful technology implementation considered by care professionals, is training and education. Training staff is not only necessary for the purpose of skills training, but is also considered as a means to empower the team itself. This is consistent with literature, stating that training and offering of support improve technology adoption. Training should include engagement of the user (including the care professional) and a shared vision of stakeholders [26]. In general, technology is more successfully implemented in work processes, if it had a positive impact on interactions between care professionals and patients, and on interactions between different professionals [27]. Apart from training, appropriate help-desk possibilities were indicated to be important in our interviews. One should be able to rely on technology and if it fails, prompt help should be available. This is consistent with the literature [28], and in order for future technology use to be successful, an adequate technological support is needed.

To our knowledge, this study is the first one to jointly address professional values, the use of technology and the future perspective of health care professionals. One strength of the study is the varied contexts in which care professionals were interviewed. The results per context slightly varied on the level of experience with and the type of technology used. In terms of professional values though, the results did not vary, and this made it possible to draw general conclusions and create an overall picture. Although external validity is weak in qualitative design as is used in this study, the wide range of contexts and the comparable themes emerging, after pooling the results from the different settings, indicates consistency and transferability.

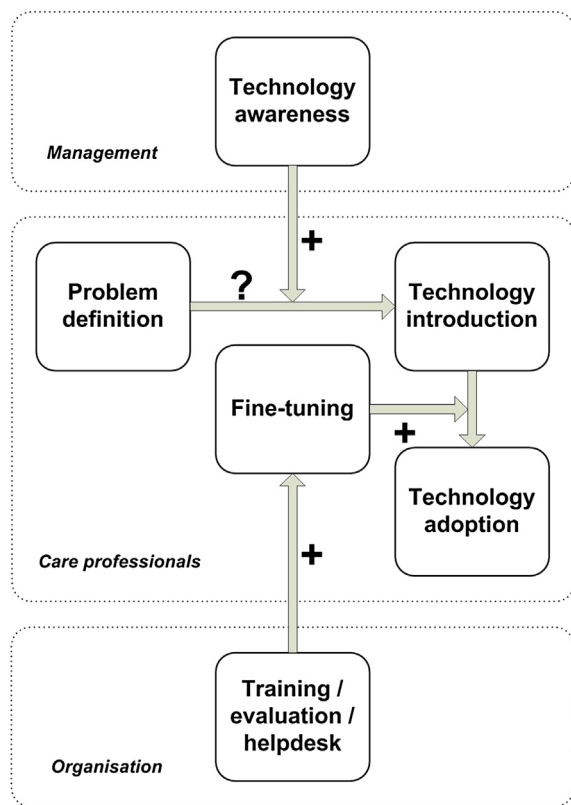


Fig. 1. Proposed pathway for technology adoption in health care facilities.

This study specifically explored the influence of professional values in the use of technology by care professionals. Of course, apart from the research questions addressed in this study, other factors play a role in technology acceptance, including factors partly attributable to the technology itself such as perceived usefulness and perceived ease of use described in the technology acceptance models [11]. Together with these general technology acceptance models, such as TAM and UTAUT [12] professional values are part of the conceptual model for the actual use of technology in health care [14]. Another limitation of our study is that we addressed care professionals' use of technology by talking to them, without actually observing their use, which might not be the same [29].

In conclusion, this study indicates that, within health care organisations, technology is not considered a logical or immediate solution for current needs. Care professionals need support in relating tailor made technological solutions to the care recipients' needs. The role of health care organisations, including technological expertise, can be crucial here. More research on these topics is necessary in order to meet future needs in health care, technology awareness and multidisciplinary education, which includes engineers and technicians.

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