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The diagnosis methods for the obstacles and difficulties in computer sciences of nursing students

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Abstract

Computer science as a school subject has been a regular media subject for more than 20 years. Indeed, all the educational systems of the world are now convinced that today's learners, brought to live in a hyper-scientific society. This research aims to discover the sources of computer difficulties encountered by some nursing students. We used two well-known methods of analysis: the Nominal Group Technique (NGT) and the Pencil/Paper Questionnaire. Data obtained revealed that the prerequisites are overestimated because the notions learned in high school are forgotten and that the basic notions of computer science seem to present difficulties for these learners. The results of the questionnaire and the NGT are similar and complementary. It becomes clear that using NGT and the questionnaire are efficient tools to diagnose the difficulties and obstacles of nursing students. The NGT can be used not only in identifying students' problems with scientific notions in computer science, but also in other subjects.

Keywords: Questionnaire, difficulties, obstacles, computer science, nursing students.

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1. Introduction

Currently, computer science becomes an essential element in health care where health specialists are responsible for dealing with a large amount of patient medical information. For example, a record of the symptoms of a patient, patient medical history, previous medical examination reports, test results, doctor's diagnoses, or a combination of them (Demiris, & Zierler, 2010; Kim, 2019). Future nurses need to master computer knowledge and skills to improve quality, safety, efficiency, and reduce health disparities (Buerck, & Feig, 2006; De Gagne et al., 2012; Demiris, & Zierler, 2010; Dixon, & Newlon, 2010).

Jiang et al. (2004) identified computer skills for nurses in seven areas: information backup / security, Internet browsing, word processing, use of health care information system, knowledge of simulation training software, and patient monitoring systems. Program development and implementation are one of the most important processes in which each nurse educator must be involved in to respond to these demands, to ensure the quality of education (Keating, 2006). Currently, nurse educators must strive to improve the program by bridging the gap between new skills for graduates and those needed for early career employment (Keating, 2006).

In order to approach this problematic issue which is the focal point of our work and to provide an answer to our research question, we resorted to a method of work implemented in the survey which is the Nominal Group Technique (NGT). In the second phase, the diagnosis of the difficulties is done through the questionnaire.

1.1. Nominal Group Technique (NGT)

Description of the NGT technique: The NGT is a technique that had its origins in psychosocial studies of the functioning of small groups (10–15 people). Set in 1968–1975 by Delbecq and Van de Ven (1971). Its first applications were in the domain of management. It quickly extended to different practices of social sciences (Awasthi, & Kannan, 2016; Gorman, & McDowell, 2017; Lamarti et al., 2008) to become the optimal search technique for an objective, systematic, and quantitative description of the content showing communications (Cunningham, 2017; Foth et al., 2016; Kelz et al., 2018). Indeed, this is a more structured method of brainstorming that is very useful for auto-evaluation and auto-diagnosis, which makes it possible to highlight the choice of priorities within a group of persons gathered at the same place around the same problematic. Thus, the group responds individually to the nominal question but the moderator works to bring out the collective reflection and this by following six stages (Carney et al., 1996; El Hassouny et al., 2012; Fuller et al., 2003; Gaskin & Hall, 2002; Gaskin, 2003; Grant et al., 2003; Madden et al., 2017; Perry, & Linsley, 2006; Williams et al., 2006)

- Step 1: Each participant writes down the responses that they consider a solution to the nominal question.
- Step 2: Collection of the ideas produced by the participants and their presentation in front of the group. We write them on the board.
- Step 3: The moderator makes sure to clarify the meaning of the different proposals stated. He may cancel some if they are found to be redundant or irrelevant to the problem.
- Step 4: Presentation of the retained responses and discussion.
- Step 5: Participants are invited to choose 9 of the proposals among those presented and prioritise them. Knowing that the proposals for responses cited first are the most significant,

we assigned to each response a weighting mark pi which goes down from the first response to the last.

- Step 6: The moderator should lay out a chart presenting the responses and their corresponding pi.

The strong point of this technique is that it combines and alternates individual work and group discussion. This technique has also been described as useful for improving curricula (Jones, & Hunter, 1995). There is evidence for its use in higher education for data collection to help in programs and evaluation development (Gaskin, 2003; Lomax, & McLeman, 1984; O'neill, & McCall, 1996). One shortcoming of the NGT is that participants cannot build on another's ideas because they never see them, so participants do not know the potential synergy that comes from the ideas of others (Dennis, & Reinicke, 2004). In addition, the opinions of group members cannot converge in the voting process, cross reproduction ideas may be limited, and the process may seem to be too mechanical (Dennis, & Reinicke, 2004; Roth, & Schleifer, 1995).

2. Experimentation and results NGT

In one class, we put together a group of fifteen of nursing students of the first semester chosen at random and we asked them the following nominal question: 'What are the difficulties and problems that you encounter while learning IT?' After having put the fifteen students into confidence, we encouraged them to express themselves freely and without constraints on one of the two sheets we distributed to them. The data collection highlighted 14 responses that we transcribed on the chart. In accordance with Step 3, we eliminated the redundant and irrelevant proposals such as the responses made no sense other than in the respondents' logic. Thus, the number of responses retained was reduced to 11. The step that followed consisted of asking the students to choose nine responses among this set and ranks them according to priority and assigning the weight 9 to the response at the top of the list, 8 to the second and so on down to the last one. Once the data were collected, they were displayed on the following chart where they are ranked according to a decreasing pi.

Table 1. The NGT results

Students' responses	pi	Rank
Forgetting the notions and concepts of the program taught during the preceding years in High school	71	1
Overloaded Course and schedule and limited time	62	2
Computer courses remain theoretical (lack of practical work)	60	3
The similarity of the contents and the lack of pedagogical development induces monotony	60	4
Students report that their computer experience was developed by personal effort	58	5
Practical work is forbidden	56	6
Practical work of a demonstrative nature	54	7
The number of students is by groups	51	8

The students find no added value in the computer course	48	9
Lack of communication between teachers and the students	45	10
Lack of motivation of students	41	11

Several problems are detected by the present method namely the forgetting of computer concepts and concepts seen in secondary school; the overload of classes in relation to the time allotted for teaching the sequences of this discipline and the lack of practical work. Indeed, the answer that comes at the top of the list with the highest weight (pi = 71) refers to forgetting. These answers are in line with the results of the bibliographic research, which confirm with certain regularity that scientific knowledge passes badly, that it is little integrated or quickly forgotten (Bautier, & Goigoux, 2004; De Vecchi, & Giordan, 1994; Edibi 2000; Tiberghien, 1988). Answer 4 clearly expresses the similarity of the contents and the absence of pedagogical development. In fact there is no continuity or complementarity ensured in the contents intended for these two sets. It can be said that the absence of pedagogical progress which is a fundamental process in the elaboration of educational content, induces monotony, which can cause student boredom and thus increase the risk of not finding any added value in the computer course. Students on their part have called for the development and improvement of computer programs. As for answer 2, where students strongly blame the inadequacy of knowledge to teach 'computer science' and the number of hours devoted to its learning (pi of 62), it reflects students' discomfort and their inability to assimilate notions within the limit. The result is corroborated by the answer 5 where, the students reported that their experience in computer science has developed through a personal effort especially the students find no added value in the computer course answer 9. The method of knowledge transmission is also asked, answers 10 and 11 which revolve around the lack of: communication, motivation, encouragement of passivity.

2.1. Survey results by questionnaire

Based on the results of the NGT, we elaborated a questionnaire consists of two types of items. The purpose of the items of the first category is to estimate the degree of forgetfulness of the basic concepts of computer science that were seen in high school. Therefore, the 6 questions relate to the prerequisites. On the other hand, the items in the second category consist of questions about the computer concepts introduced in higher education in order to estimate their degree of difficulty. -Questions category 1 (G1): Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q12 and Q19. - Category 2 questions (G2): Q8, Q9, Q10, Q11, Q13, Q14, Q15, Q16, Q17 and Q18. It should be noted that the questionnaire made up of 89 students chosen at random 2 weeks after the course.

Table 2. The results of the questionnaire

°Q		Percentage of right responses	Number of false responses	No responses (%)
Q1	-General computer literacy	12.35	68.53	19.10
Q2	-Computer literacy -computer	21.34	59.55	19.10

	vocabulary			
Q3		30.33	33.70	35.95
Q4	-Operating system	22.22	22.47	57.3
Q5	-computer architecture and its features	19.10	23.59	57.3
Q6		26.94	37.07	35.95
Q7		49.43	49.43	26.96
Q8		68.53	21.34	10.11
Q9		86.51	6.74	6.74
Q10		89.88	2.24	7.86
Q11		69.66	25.84	4.49
Q12		16,85	56.18	26.96
Q13	Basic network and computer security	28	64	7.86
Q14		33.70	52.80	13.48
Q15		40.44	46.06	13.48
Q16		57.30	34.83	7.86
Q17	Internet—web—intranet	48.31	30.33	21.34

Q18	47.19	17.97	34.83
Q19	10.11	68.53	21.34

The first conclusion that appears from the analysis in Table 2 is that the number of correct responses to the G2 questions is significantly higher than the correct responses to the G1 questions. Indeed more than half of the students responded the G2 questions correctly; this percentage exceeds 89% for some questions. The situation is reversed in the case of G1 questions where the percentages of false answers take over. Thus, we note that, the best score of good responses to G1 does not exceed 49.43%. Indeed, these students appear to be more efficient in their responses to the questions related to the recent notions compared to the questions relating to the notions learned previously. This is much more of a memory effect than a mastery of concepts. Previous knowledge is forgotten, which reveals an ineffective learning that is limited to memorisation and does not go as far as deepening knowledge, i.e., surface learning (Romainville, 2000, 2001). The second observation to note relates to the very low percentages (0% to 40.44%) of the responses to questions on Basic Network and IT security (Q12, Q13, Q14, and Q15) and this in both categories G1 and G2. The students tested still clearly have some conceptual difficulties on the fundamental's concepts of Basic Network and IT security and this difficulty continues despite their progress in the sequences on the Basic Network and IT security. In fact, only 25 students (28%) were able to successfully rehearse (Q13, category G2), which shows that non-assimilated pre-requisites may well constitute an obstacle to efficient learning and reinforce surface learning (Barnier, 2001; Noel, & Romainville, 1998; Romainville, 2000, 2001; Tinto, 1987) and therefore the rapid forgetfulness of notions learnt.

3. Conclusion

The purpose of this work was to diagnose the difficulties and obstacles related to learning the 'computer science' sequence at the undergraduate level in nursing students. For this, we brought together two methods of analysis: the NGT and the Pencil / Paper Questionnaire. The NGT, which is a method of generating ideas, enabled us to give an overview over the difficulties and obstacles of students related to the computer course. The results obtained by the questionnaire were consistent and complementary to those of the NGT. Thus, this analysis made it possible to highlight conceptual difficulties and notional confusions in the surveyed population. License holder teachers in nursing must therefore be vigilant and not overload students with syllabus, especially those related to Basic Network and Computer Security. At the end of this study, we can also say that this method of generating ideas: NGT is a tool of "indicative" diagnosis of learners‟ difficulties. Obstacles and problems detected should be checked and confirmed by standard diagnostic methods such as questionnaire and interview.

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Questionnaire

Q1-Computer science Is:

- A computer
- The science of knowledge processing
- The science of rational information processing

Q2-To carry out information processing, we perform:

- A reading
- An arithmetic calculation / or logic
- A calculation

Q3-To take knowledge of the data to be processed, one carries out:

- A writing
- A reading
- A digital processing

Q4-In the microcomputer the treatment of the information is realized by:

- The microprocessor
- The RAM memory
- ROM memory.

Q5-The RAM is:

- Non-volatile
- Soft
- Volatile

Q6-To save the information permanently, I use:

- A hard disk (head)
- The mouse
- The motherboard

Q7-In a folder, we can find two files with the same name and the same extension.

- Yes
- No

Q8-What is the BIOS?

- This is the motherboard configuration tool
- It's a game
- It's a device

Q9-To create a text file, I can:

- Right click then new and text document
- Click file and then new text document
- Open notepad
- Open WordPad

Q10-To rename a file, I can select it and ...

- Press F5
- Press F2
- Right click and then rename
- Left click once on the name

Q11-By default, when the user double clicks on the file memo.txt, the file will be loaded automatically in the program:

- Word
- Notepad
- Excel

Q12-What is the hardware used to interconnect two networks at level 3 of our reference model:

- Concentrator
- Switch
- Router

Q13-A LAN depends on a telecom operator to work properly:

- Yes
- No
- Sometimes

Q14-In an Ethernet network, during the broadcast 'a frame, a post:

- Stay inactive
- Continue the eco use of the signal
- Sends a frame

Q15-What is WiFi?

1. A wireless network

2. An Internet network passing through the telephone network

3. An ADSL-type mobile telephone network

16-Wi-Fi uses architecture:

- linear
- Cellular
- Circular

Q17-The information that goes through the Internet is cut into pieces that are called:

- Frames
- Recordings
- Packets

Q18-Internet uses a topology:

- Bus
- Star
- Mesh

Q19-What is called the functionality that allows you to move from one point to another in the same page, from one page to another or from one site to another:

- An absolute reference
- An implicit link
- A hypertext link