Learner's satisfaction within a breast imaging

eLearning course for radiographers

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Summary

1. Breast cancer & eLearning

2. An eLearning course on breast imaging for radiographers

3. Experimental study for the course evaluation

4. Impact results focusing on learners' satisfaction
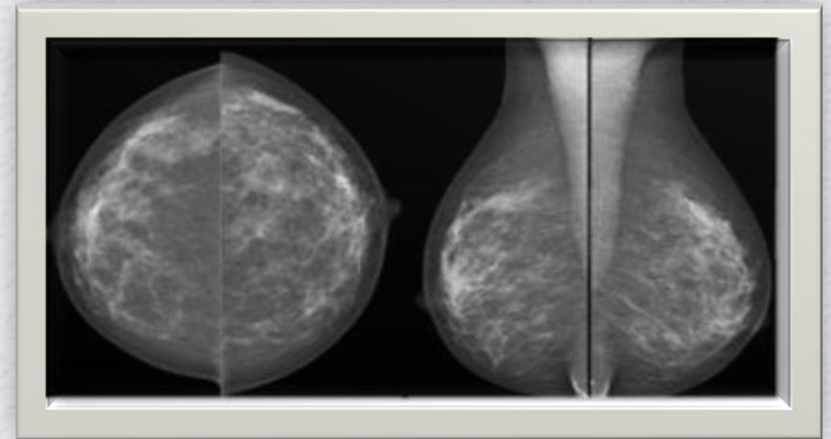
5. Discussion and conclusions

1.

**Breast cancer
& eLearning**

Breast cancer

- Breast cancer

  - 2008: the most common cause of cancer-related death in women worldwide[1]

  - Europe: one in every 10 women will develop the disease[2]

  - Portugal: 1500 women die every year[3]

- Mammography[4]

  - Screening

  - Diagnosis

  - Intervention

(Centro de Mama, CHSJ, 2011)

[1] – Boyle, 2008
[2] – Jemal, Global Cancer Statistics, 2001
[3] – Liga Portuguesa contra o cancro, 2009
[4] – Lee, Journal of American College of Radiology, 2010

Radiographer

- The **radiographer** has a key role in the performance of mammography[1]

- Education and training programmes are crucial to **improve** the radiographer's professional **knowledge**, **skills** and **behaviour**[1]

- **ELearning** must be considered as a relevant continuing education tool[2]

[1] – Cataliotti L, et al. Eur J Ca 2007;
[2] - Ruiz J, J Assoc Amer Med Colleges, 2006

ELearning

- Advantages:
  - Asynchronous ability
  - Cost-savings
  - Personalised learning
  - Increase of accessibility
  - Ease of distribution
  - Ease of update content

- Software used:
  - Wiki, websites
  - Fóruns, blogs
  - Learning Management Systems (LMS) – Moodle

ELearning evaluation

ELearning needs to be justified by its effectiveness and relevance
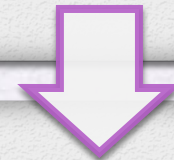
User's satisfaction and knowledge

Most study designs used:
- Non randomised
- With and without control

Randomised controlled trials are strongly recommended to evaluate eLearning systems in order to get more strong evidence[1,2]

[1] – Chumley-Jones *et al.*, A Amer Med College, 2002;
[2] - Liu J, J Am Med Inform Assoc. 2011.

Evaluation tools

- **Pre and post-knowledge tests**

- **Satisfaction questionnaires**

  - Wang, 2003[1]: a complete domain for the eLearner satisfaction measurement[1]

  - Seven-point Likert scale

  - 26 items: content, interface and navigation, personalization, learning community

    - The last two questions: overall satisfaction and success

  - Reliability (Cronbach alpha) of 0.95

[1] – Wang, Information &Management, 2003

Aim

- Assess the learners' satisfaction within an eLearning course on breast imaging for radiographers.

2.

An eLearning course on breast imaging for radiographers

ELearning course

- Portuguese language

- Developed using HTML, JavaScript and PHP

- Hosted on the server of Faculty of Medicine of University of Porto

- Asynchronous

  - 20 days period available through an individual login

- Contents reviewed by specialists from Centro Hospitalar S. João, Porto (CHSJ)

  - Text, images, videos, Prezy® presentations, tables with main key-points, formative tests

  - Clinical and radiological images were collected directly from the Breast Centre at CHSJ

ELearning course

- Contents

  - Based on *Guidelines on the standards for the training of specialised health professionals dealing with breast cancer, EUSOMA[1], 2007*

Module 1	Breast anatomy and physiology of breast
Module 2	Breast cancer: multidisciplinary approach
Module 3	Breast pathology
Module 4	Mammography: technical approach

ELearning course

ELearning course

Senologia para Técnicos de Radiologia
Curso eLearning

| Início | Módulo 1 | Módulo 2 | Módulo 3 | Módulo 4 | Avaliação Final |

Bem-vindo(a) Guest!

O seu progresso:

100%

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GLOSSÁRIO
SAIR

Define-se por **Senologia** a ciência multidisciplinar no estudo da patologia mamária.

Este curso visa promover conhecimento aos técnicos de radiologia e alunos de licenciatura em Radiologia sobre inúmeros aspectos relacionados com a patologia mamária, e o desenvolvimento de competências para a execução, leitura e interpretação de mamografias.

Encontra-se dividido em quatro módulos:
Módulo 1 – Anatomia e fisiologia da mama;
Módulo 2 – Abordagem multidisciplinar do cancro da mama;
Módulo 3 – Patologia da mama;
Módulo 4 – Mamografia: abordagem técnica.

Para uma melhor abordagem do curso, aconselhamos a consulta da página das instruções.

Inês C. Moreira, 2012 | Mestrado em Informática Médica | Faculdade de Medicina / Faculdade de Ciências / Universidade do Porto

ELearning course

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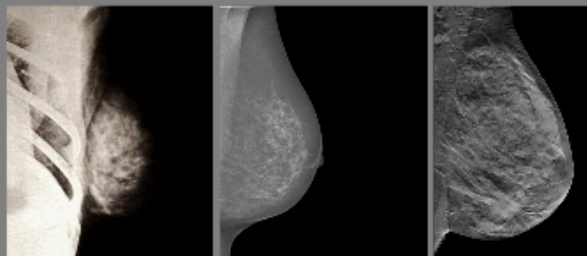GLOSSÁRIO
SAIR

Referências:

Módulo 4 Mamografia: Abordagem Técnica

Perpectiva Histórica

A apresentação que se segue indica os principais marcos históricos da evolução da Mamografia, e sua importância para o rastreio do cancro da mama.

Para ver a apresentação em *fullscreen*, após clicar na seta pode clicar em "*More*" e selecionar "*Fullscreen*".

Mamografia:
Perspectiva histórica

ELearning course

Início | Módulo 1 | Módulo 2 | Módulo 3 | Módulo 4 | Avaliação Final

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Módulo 4 Mamografia: Abordagem Técnica

Pontos-Chave

O seu progresso:

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Referências:

- A Compressão é de extrema importância pois permite diminuir a espessura da mama, homogeneizar os tecidos e colocar as estruturas da mama o mais próximo possível do recetor, diminuir a radiação dispersa produzida, reduzir a dose absorvida pela mama, reduzir o fluo cinético e reduzir o fluo geométrico;

Fatores que determinam o espectro de Raio X

Ânodo — Combinação Ânodo-filtro — Filtro — kV

Molibdénio — Mama adiposa — Molibdénio
Ródio ou Tungsténio — Mama densa — Ródio

25 26 27 28 29 30 31 32

2 CM — 4 CM — 6 CM

Espessura da mama aquando da compressão

- O sistema AEC encontra-se por baixo do recetor e controla a atribuição de miliamperagem (mAs), de acordo com os kV atribuídos, assim como a pista do ânodo e o tipo de filtro mais adequado para a mama em questão;

- Dose Glandular Média: atualmente é de cerca de 1 a 2mGy por incidência;

- Proteção radiológica: rotação lateral da cabeça da paciente, fornecer colar da tiroide e avental de chumbo sempre que solicitado, equipamento com filtros, grelha anti-difusora e uma ampola com uma angulação de 10° a 20° - o feixe primário de radiação tangente à parede torácica (efeito anódico);

- O Técnico de Radiologia assume um papel fundamental na execução da mamografia com o principal objetivo de

ELearning course

Módulo 4 Mamografia: Abordagem Técnica

Teste

1. Segundo a legislação portuguesa, a força máxima de compressão aplicada na mama deverá ser:

○ a) Entre 20 a 30 Kg;

○ b) Entre 5 a 12 Kg;

◉ c) Entre 13 a 20 Kg;

○ d) Entre 2 a 9 Kg;

○ e) Não sabe / Não responde.

2. Que fator é determinante no espectro do raio-X em mamografia?

○ a) O material do ânodo da ampola;

○ b) A força de compressão;

○ c) O tipo de aquisição de imagem;

○ d) A proteção radiológica;

◉ e) Não sabe / Não responde.

ELearning course

Bem-vindo(a)
Guest!

O seu progresso:

100%

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SAIR

Referências:

Teste

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○ d) Entre 2 a 9 Kg;

○ e) Não sabe / Não responde.

✔ **Correcto**

2. Que fator é determinante no espectro do raio-X em mamografia?

○ a) O material do ânodo da ampola;

○ b) A força de compressão;

○ c) O tipo de aquisição de imagem;

○ d) A proteção radiológica;

● e) Não sabe / Não responde.

👤 **Não respondeu. Resposta certa: a**

3.

Experimental study for the course evaluation

Stratified controled randomised trial

Stratified sample

- Radiography students
  - Already had mammography clinical training
- Radiographers
  - Public health institutions in Porto's metropolitan area

Intervention and control groups

- Intervention: perform the eLearning course
- Control: do not perform the eLearning course

Outcomes

- Evolution in knowledge (pre and post-tests; efficacy)
- Learners' satisfaction

Satisfaction questionnaire

- Wang, 2003

  - Translated to Portuguese by an expert translator

  - Additional questions:

    - eLearning experience

    - Health related eLearning experience

    - Open-answer question for comments

  - Demographic data was collected at the course's first login

Study design

Radiographers → Pre-test → 21 days

Intervention: 21 days → Course → 20 days → Post-test → 5 days → Satisfaction questionnaire

Control: 41 days → Post-test → 21 days

Students → Pre-test → 21 days

Intervention: 21 days → Course → 20 days → Post-test → 5 days → Satisfaction questionnaire

Control: 41 days → Post-test → 21 days
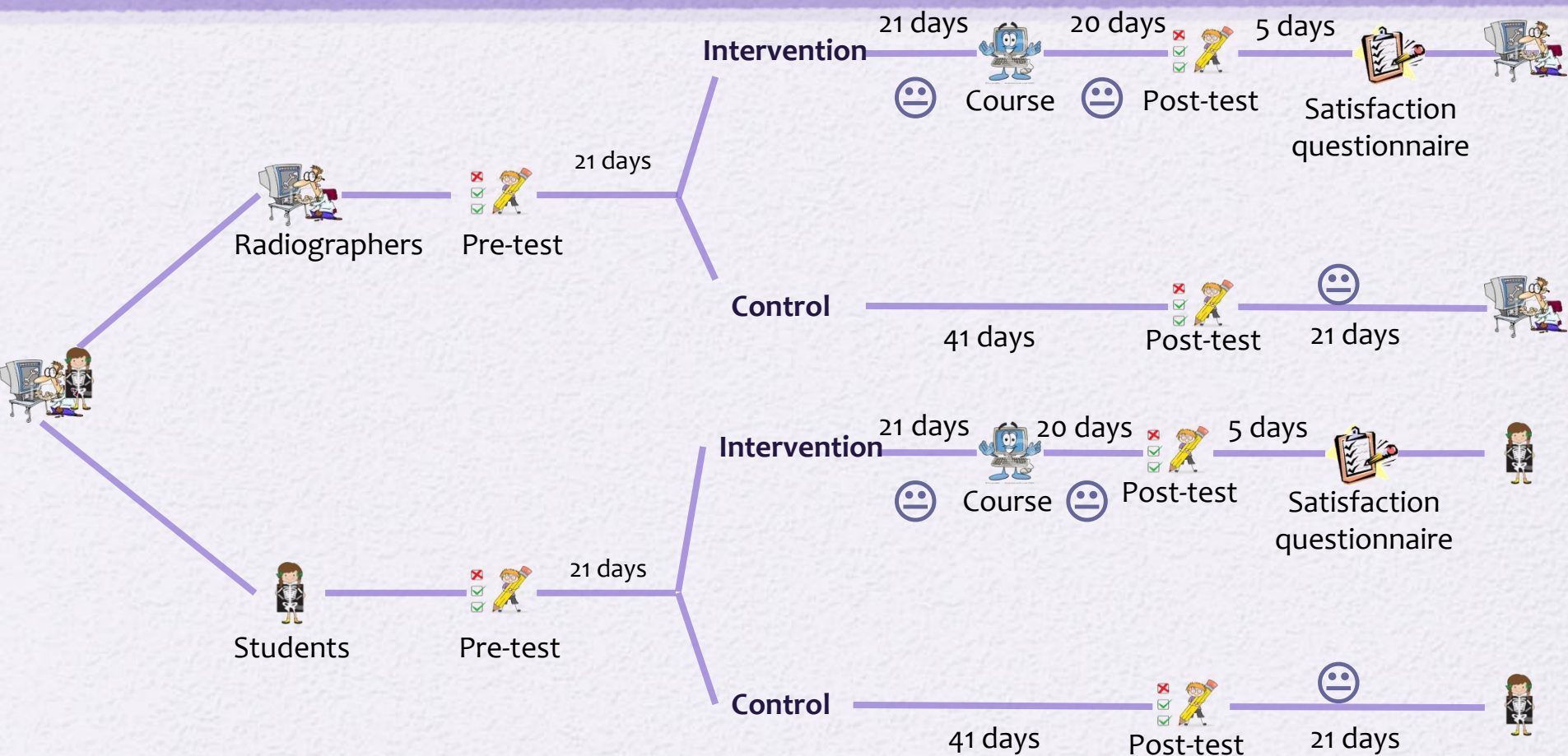
☺ Drop-outs: lost-to-follow-up or discontinued intervention

Statistical analysis

- Normality
  - Kolmogorov-Smirnov test (total sample)
  - Shapiro-Wilk test (for each group)

- Homogeneity
  - Mann-Whitney U test
  - Chi-square test or Fisher's exact test for nominal variables

- Significance level: 5%

- IBM SPSS Statistics®, V. 17.0

4.

Impact results focusing on learners' satisfaction

Results

#120

Radiographers

9 days

#68

#34

5 days

13 days

1 day

#29

3 lost-to-follow-up

2 discontinued intervention

#34

41 days

8 lost-to-follow-up

7 days

#26

#190

Students

#70

9 days

#39

#20

9 days

15 days

2 days

#11

7 lost-to-follow-up

2 discontinued intervention

#19

41 days

3 lost-to-follow-up

3 days

#16
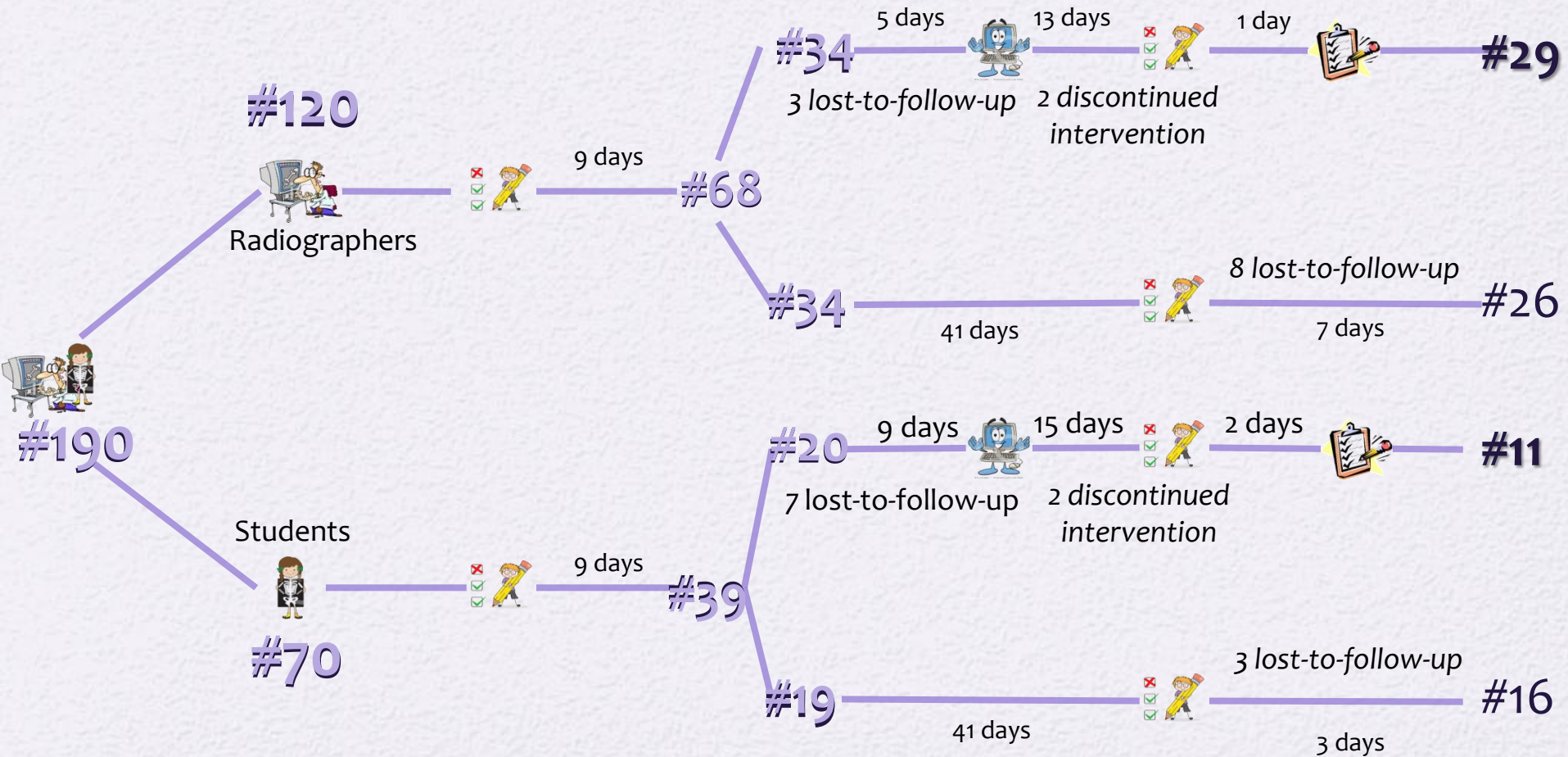
Sample description

	Students (n=11)	Radiographers (n=29)	Total (n=40)	*p*-value
Sex, n (%)				
Female	9 (82)	24 (83)	**33 (83)**	0.182
Male	2 (18)	5 (17)	7 (17)	
Age, med (P25;P75)	21 (21;22)	31 (27;39)	28 (23;35)	0.001
Academic qualifications, n (%)				
3rd year	4 (36)		4 (10)	
4th year	7 (64)		7 (18)	
Bachelor		3 (10)	3 (7)	
Graduation		23 (80)	**23 (58)**	
Master		3 (10)	3 (7)	
Years of profession, med (P25;P75)		9 (4;18)	**9 (4;18)**	
Routine mammography				
0		12 (42)	**12 (30)**	
<30 per week		12 (42)	**12 (30)**	
30-40 per week		2 (6)	2 (5)	
>40 per week		3 (10)	3 (8)	

Efficacy and effectiveness

- There was **evolution** in **knowledge** from those who performed the course

  (**23 pp;** *p*=0,004)

- **81**% individuals **accepted** to perform the course

  - 9% participants did not conclude the course (discontinued intervention)
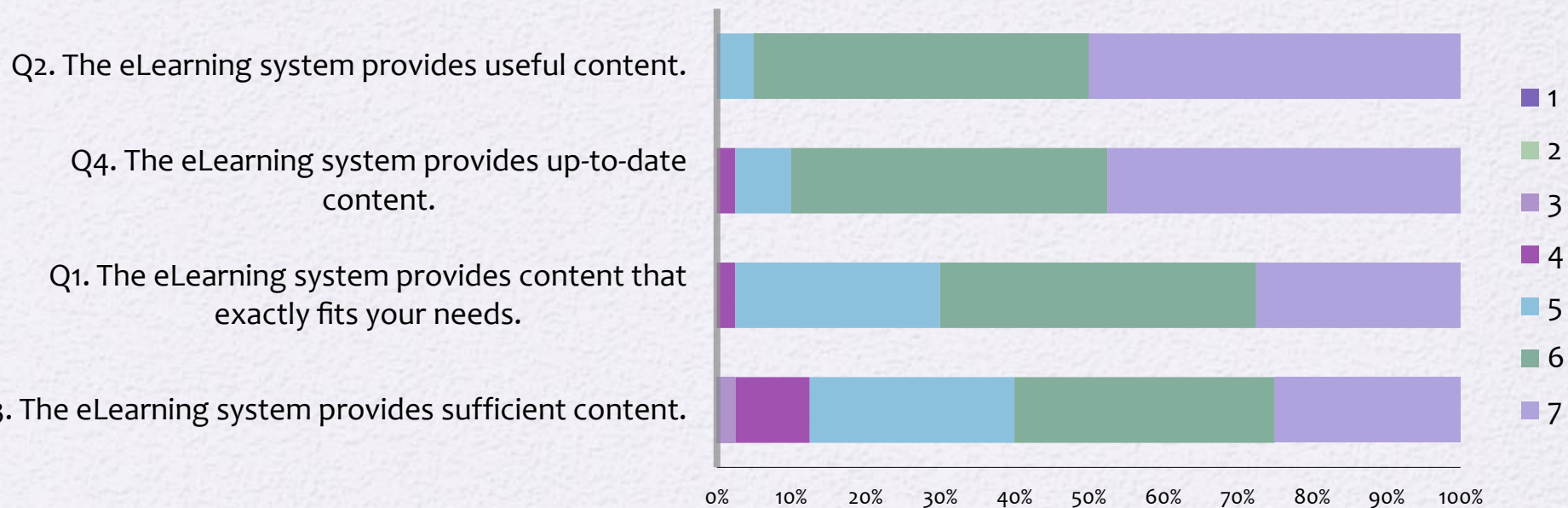
Satisfaction

- Satisfaction questionnaire

  - Global measures (last two questions, Q25 and Q26):

    - 85% participants were **satisfied** (students vs. Radiographers, *p*=0.835)

    - 87,5% participants considered the eLearning course **successful** (*p*=0.698)
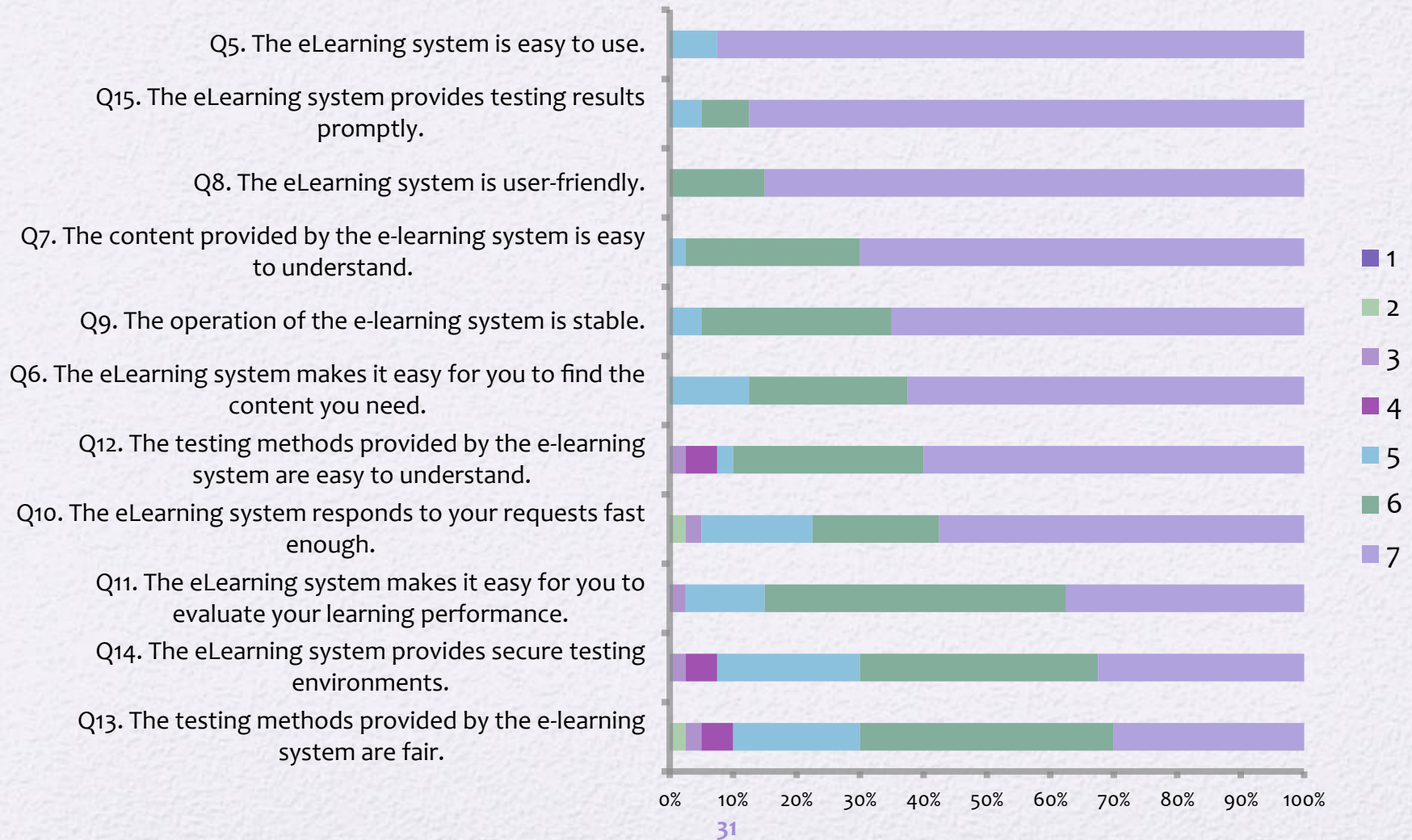
Satisfaction

- Satisfaction questionnaire

  - Content (Q1-Q4)

  - Interface and navigation (Q5-Q15)

  - Personalisation (Q16-Q20)

  - Learning community (Q21-Q24)

Content (Q1-Q4)

30

Interface and navigation (Q5-Q15)

Personalisation (Q16-Q20)

Q16. The eLearning system enables you to control your learning progress.

Q19. The eLearning system records your learning progress and performance.

Q18. The eLearning system enables you to choose what you want to learn.

Q17. The eLearning system enables you to learn the content you need.

Q20. The eLearning system provides the personalised learning support.

Legend: 1, 2, 3, 4, 5, 6, 7

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Learning community (Q21-Q24)

Q24. The eLearning system makes it easy for you to access the shared content from the learning community.

Q23. The eLearning system makes it easy for you to share what you learn with the learning community.

Q21. The eLearning system makes it easy for you to discuss questions with your teachers.

Q22. The eLearning system makes it easy for you to discuss questions with other students.

Legend: 1, 2, 3, 4, 5, 6, 7

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

33

ELearning experience

- 4/40 participants had eLearning experience

  - 2/4 had health related eLearning experience

- Overall satisfaction did not differ between these participants and those who had no experience (Q25: p=0.262; Q26: p=0.207)

- Q11: easy evaluation of the learning process (p=0.042)

5.

Discussion and conclusions

Discussion

- The participants who concluded the course were very satisfied

- Comments highlighted the intuitive interface and the useful content

- No significant differences between students and radiographers

Discussion

- High degree of satisfaction

  - Interface

  - Content

- Lower degree of satisfaction

  - Learning community

  - The development of the course did not take that into consideration

- Q11 – evaluation learning performance

  - Learners with previous experience showed lower satisfaction

  - Improvement of the course concerning this component

Discussion

- Inexistence of a satisfaction questionnaire in Portuguese

  - Validity should be carefully discussed

  - Translation can be a starting point

- Moderate sample

- Innovative character on breast imaging learning for radiographers in Portugal

Research contributions

- Provides a new easy-to-use eLearning course

- Contributes to the breast imaging learning

- Emphasises the continuing education and professional development

- Fills the lack of randomised control trials in the eLearning evaluation

- User's satisfaction is an important contribution for better eLearning systems thus providing more effective knowledge gain