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Learner Engagement Patterns in an E-Learning Palliative Care Program: A Usage-Based Analysis of eELCA Course Participants

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ABSTRACT

E-learning has become widely accepted as an effective means of providing palliative care education to healthcare and social care professionals. However, we know very little about how learners use digital tools in this field. The study examines how learners utilise the end-of-life care (eELCA) program by analysing the most popular modules, the time spent on them, completion rates, and their learning behaviour. A descriptive analysis was done using information (2016-2017) from the Spanish eELCA Learning Management System cohort. We studied module login frequency, the duration of their sessions, whether students completed the course, and anonymised demographic details. Engagement behaviour was examined using descriptive statistics.

Advance Care Planning and Assessment for end-of-life care were accessed most frequently, suggesting that learners believed them to be highly relevant. Users spend varying amounts of time interacting with the modules, likely due to differences in learning preferences and material difficulty. Learners with a strong interest in specific topics worked through these modules, although fewer learners accessed them. The study reveals that learners interact selectively, primarily based on how closely the content aligns with their knowledge needs. They demonstrate that flexible e-learning is the most effective approach for palliative care education. Future work should connect engagement with performance outcomes and utilise inferential techniques to gain a deeper understanding of learning habits.

Keywords: e-learning, palliative care, end-of-life, eELCA, user engagement, module completion, healthcare education, usage analytics

INTRODUCTION

As higher-level care for sick patients is increasingly in demand, online courses have emerged and are being utilised. E-learning is suitable for those working in palliative care due to its ability to adjust and accommodate various needs. Still, what determines success and effectiveness is the engagement of the learners (Schulz-Quach, Wenzel-Meyburg, & Fetz, 2018; Semple et al., 2024). This research highlights that the end-of-life care (eELCA) program is a crucial online resource for training professionals in end-of-life care.

Various studies suggest that using technology to learn enhances a professional's clinical expertise and self-confidence in providing eELCA (Ferreira, Elvas, Correia, & Mascarenhas, 2025; Goodyear et al., 2011). Research suggests that digital tools can enhance the social skills of individuals working in demanding healthcare jobs, foster empathy, and support informed decision-making (Anstey et al., 2016; Button, Harrington, & Belan, 2014). With e-learning, people can learn whenever and wherever, and as the content can be swiftly updated to stay current. Even so, it is still very challenging to keep learners engaged. Relying on usual evaluation approaches, such as assessment scores or tests at the start and end, tells us little about what learners do with or within the learning material (Sahoo, Pandey, Mishra, & Communication, 2024; Shukor, 2012)

Learning analytics has enabled us to understand interactions within learning management systems. Through usage-based evaluations, it becomes possible to track learners' login times, the amount of time they spend browsing the material, and the order in which they complete it (Papamitsiou, Economides, & Society, 2014). The use of this data has significantly helped understand which strategies can best encourage online learners to complete their courses (Cook et al., 2010). Still, these approaches have been largely overlooked in the assessment of e-learning in palliative care. It is also important to note that there is limited evidence on how team members with diverse backgrounds participate in care.

Although academics agree that e-learning is essential in palliative care, how learners utilise the available training is not fully understood. Existing systems fail to capture what users are doing in real time. In addition, learners' actions from actual use can reveal exactly how engaged or unengaged they are, at both the module level and the course level. The information is crucial for improving the way courses are built, the learning experience, and the practical requirements of care providers (Cook et al., 2010; Papamitsiou et al., 2014).

This study aims to investigate and understand user behaviour using the eELCA program. The four areas covered include the popularity of modules, the time each module is used, overall engagement trends, and the number of modules completed. Moreover, the study looks at engagement among doctors, nurses, and allied health professionals using data from the Spanish eELCA Group. It enables the study of how people interact, as well as explaining these interactions based on the learners' characteristics.

The findings from this study can help designers of e-learning in palliative care enhance and improve their approaches. This research may help inform the development of future content, enhance outcomes for learners in digital health, and provide additional evidence for effective practices. The work aims to gain a deeper understanding of the use of e-learning in palliative care and utilise it to enhance team training effectiveness.

METHOD

The obtained secondary data from the eELCA Learning Management System (LMS) and records of the eELCA Group in Spain cover a period between October 2016 and October 2017 with a view to establishing course use by learners and then comparing any differences found between groups. It constitutes two parts: the first with metrics from the LMS, such as how modules are accessed by time and how it is marked as completed, time spent per session, and the number of sessions per user; the second one with demographic information coming from the Spanish eELCA Group, like age, sex, work, and primary speciality. All of this was collected under the setting of anonymity to participants, but enabled data linkage between different sources for comprehensive analysis. The participant pool was limited to users who interacted with the Spanish eELCA platform at the start of the study period and completed at least one module. It had all the required demographic records available, thereby excluding users with unavailable or incomplete data.

In this study, the operationalisation of user engagement was done by taking three key variables and using three key measures. First, Module Popularity was measured based on the overall number of users who utilised any given module, serving as a baseline measure of course content utilisation. Second, the Engagement Duration was measured by calculating the total time a user spent in one of the modules, which is used as a direct measure of the degree of interaction with the learning material. Lastly, Learning Behaviour Patterns were also recorded using a multi-faceted method of examining the number of logins, total number of modules accessed, and the sequence of navigating the modules; the composite measure of Learning Behaviour Patterns was intended to provide deeper insights into studying behaviour and strategic use of the curriculum. These particular items were chosen to go beyond simplistic measures and provide a more nuanced picture of how various user demographics (including profession, speciality, age, and gender) could affect the amount and quality of interaction with the e-learning platform.

Descriptive statistical analyses were used to determine these patterns of engagement. The primary measures, such as counts, averages, and percentages, were computed to assess the popularity of the module, time spent, and the rates of completion. Although the sample size was too small to perform any form of inferential testing, we were able to observe trends according to demographic factors like profession and speciality to examine the possible effects on learning behaviour. These descriptive summaries were created with the help of SPSS and Excel.

All secondary data gathered by the authors was compiled according to the ethical principle, as all the information analysed was de-identified to maintain the anonymity of participants. This research was conducted based on ethical approval granted by the Spanish eELCA Group on October 12, 2016, which gave the official permission to use this dataset.

The frequency of user logins determined the popularity of modules in the course as a whole. The statistics showed that foundational and clinical skill modules were the most obvious choice (eELCA 01 - Advance Care Planning (408 logins), then came eELCA 02 - Assessment in End-of-Life Care (311 logins) and eELCA 03 - Communication Skills (253 logins). On the other hand, modules such as eELCA 07 - Bereavement Care (17 logins) and eELCA CA 10 - Specialist Content (20 logins) showed significantly less engagement, indicating they

were used more selectively.

Table 1: Total Logins per eELCA Module Headings

Course Title	Logins
eELCA - Introduction to End-of-Life Care	150
eELCA 01 - Advance Care Planning	408
eELCA 02 - Assessment in End-of-Life Care	311
eELCA 03 - Communication Skills	253
eELCA 04 - Symptom Management	160
eELCA 05 - Integrating Learning in End-of-Life Care	33
eELCA 06 - Social Care	23
eELCA 07 - Bereavement Care	17
eELCA 08 - Spiritual Care	26
eELCA CA 10 - Specialist Content	20

These findings indicate that Advance Care Planning (eELCA 01) and Assessment in End-of-Life Care (eELCA 02) were the most popular modules, together accounting for over 700 times user logins, reflecting high learner interest in foundational and assessment-related content.

Figure 1: Distribution of User Logins Across eELCA Modules

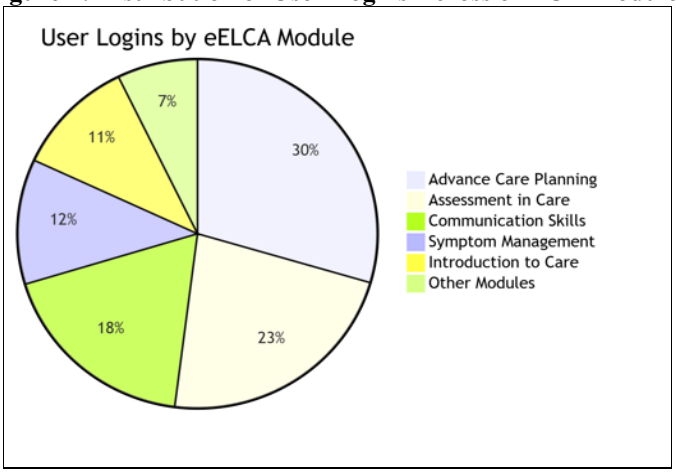

Table 1 presents the distribution of logins to each module, and Figure 1 provides a graphical summary of the same. The 150-login Introduction to End-of-Life Care module served as a baseline. However, it was not the most popular, and confirmed that applied clinical topics such as ACP and patient assessment were of most interest to learners.

The engagement time analysis revealed variability in time expenditure within the eELCA curriculum, a common outcome in online learning environments where engagement is influenced by content complexity, background knowledge, and relevance (Wakjira & Bhattacharya, 2021). The summarised data, presented in terms of median to reduce the skewing effect of extreme outliers, indicated that core clinical modules received the highest level of sustained attention. For instance, eELCA 02 - Assessment in End-of-Life Care, with a maximum engagement of 10 hours, had a median duration of 48 minutes, compared to 42 minutes for eELCA 03 - Communication Skills. Conversely, more focused modules, such as eELCA 07 - Bereavement Care and eELCA 08 - Spiritual Care, had shorter median engagement durations of 24 and 29 minutes, respectively. These short minimum times (less than 30 seconds on some core modules) are typical of behaviour found in other Learning Management System (LMS) analytics, in which disengagement, content skimming, or exploration are common events. This dichotomy of engagement time highlights a correlation between the content type and the investment of the learner; fundamental, high-yield clinical issues (e.g., Assessment, Symptom Management) led to more in-depth, variable sessions, and specialised, narrow-focused issues led to shorter sessions. This implies that the curriculum can offer adaptable material that can be revised at short notice and delved into in detail to meet the needs and time schedules of various learners.

Table 2: Average Time Spent per eELCA Module Heading

Course Title	Average Time Spent (Range)
eELCA - Introduction to End-of-Life Care	14 seconds – 2 hours and 12 minutes
eELCA 01 - Advance Care Planning	10 seconds – 1 hour and 45 minutes
eELCA 02 - Assessment in End-of-Life Care	12 seconds – 10 hours
eELCA 03 - Communication Skills	12 seconds – 4 hours and 75 minutes
eELCA 04 - Symptom Management	17 seconds – 1 hours and 47 minutes
eELCA 05 - Integrating Learning in End-of-Life Care	5 minutes – 1 hour and 08 minutes
eELCA 06 - Social Care	31 seconds – 42 minutes
eELCA 07 - Bereavement Care	10 minutes – 37 minutes
eELCA 08 - Spiritual Care	11 minutes – 1 hour and 31 minutes
eELCA 10 - Specialist Content	8 minutes – 1 hour and 11 minutes

The given table of time intervals needs to be interpreted to determine its connection to the course material. The amount of time it takes, indicated by the broad distributions, is not a measurement in and of itself of the learning process but should be interpreted in terms of the nature of the content, its complexity, and probably the purpose of its use. For instance:

The module of the broadest range, eELCA 02 - Assessment in End-of-Life Care (12 seconds - 10 hours), probably includes broad, complex, and clinically critical material which either some learners search through to get a particular detail (very short times) or some learners use as a depth resource or training resource over the long term (very long times). On the contrary, a module such as eELCA 07 - Bereavement Care (10 - 37 minutes) is particularly focused and has a more defined scope, resulting in a more consistent and concise engagement.

Content Type and Learner Strategy are very short, with minimum times (e.g., 10-17 seconds on core modules), which are probably not learning activities, but rather snacking on the content, learning module lengths, or getting back to a dashboard. This is a typical behaviour of Learning Management Systems, commonly observed during the exploration of the user interface rather than content interaction. On the other hand, the increased duration of time in courses such as eELCA 03 - Communication Skills suggests that the course may incorporate more reflective activities, video role-playing exercises, or more challenging material, which could necessitate greater cognitive processing.

According to the data, there is a trend towards the shortest possible engagements of the foundational, high-stakes clinical topics (Assessment, Symptom Management, and Advanced Care Planning) as well as the most extended possible engagements, meaning their usefulness both in quick reference and in-depth study. More compressible ranges are seen in specialised topics (Social Care, Spiritual Care), implying that they are read in a more linear, exhaustive way, probably by a self-selected audience with a particular learning objective.

Thus, these quantities of time will be open to misinterpretation unless they are connected to the content attributes (i.e. scope, complexity, instruction design (e.g. video, text, interactive exercises), perceived utility). This interpretation can be strengthened by incorporating additional data, such as median and mean times, to gain insight into the "standard" learner experience, and by conducting a qualitative study of the module's contents.

At the session level, there were differences in how participants accessed various modules. Most participants accessed the session titled "00_01 Introduction to e-learning for End-of-Life Care," with a total of 76 login sessions, and the next most popular was "01_01 Introduction to principles of ACP," with 65 users logging in. There were multiple sessions with moderate engagement, ranging from 20 to 30 logins.

Table 3: Login Frequency by Session Module in e-Learning for End-of-Life Care

Session- modules accessed	Logins Number
00_01 Introduction to e-learning for End-of-Life Care	76
00_02 Relationship Between Palliative Care and End of Life Care	57
01_01 Introduction to principles of ACP	65
01_02 Cultural and Spiritual Considerations in ACP	54
01_02 Making the Most out of Listening	16

01_03 Benefits and risks of ACP to patients, families, and staff	31
01_03 What do we mean by Body Language	5
01_04 ACP in practice: using end-of-life care tools	24
01_04 Responding to Challenges in End-of-Life Care	5
01_05 Advance Decisions to Refuse Treatment: Principles	27
01_06 Practical Application	6
01_06a Advance Decisions to Refuse Treatment in Practice	18
01_06b Writing an Advance Decision to Refuse Treatment	13
01_07 Mental Capacity Act - Aims and Principles	15
01_08 Mental Capacity Act in practice	14
01_09 Approaching ACP when capacity is uncertain, fluctuating, or likely to deteriorate	16
01_10 ACP and different trajectories	11
01_11 Introduction to conducting conversations about advanced care planning	20
01_12 How to get started and get the timing right	19
01_13 How to handle patients' questions and concerns	11
01_14 How to Document Conversations About Advance Care Planning	17
01_15 How to Negotiate Decisions Which May be Difficult to Implement	14
01_16 How to review previous ACP decisions	17
01_17 Developing ACP in your organisation	14
01_18 Developing your practice: clinical supervision, further reading.	13
02_01 Introduction to principles of assessment in End-of-Life Care: Part 1	14
02_02 Introduction to principles of assessment in End-of-Life Care: Part 2	19

At the same time, users accessed topics such as "Body Language" and "Responding to Challenges" infrequently, with each topic receiving only a few logins (Table 3). It appears that learners primarily followed the main modules, using additional or advanced resources less frequently. The "Login Frequency" measure of data is the overall number of individual access events, or logins, per particular module session, not an average or a statistical measure derived. That crude number provides a direct measure of the visibility of each session and the first option for learners to work with the material. This frequency data, however, will not have much interpretative quality without context with respect to the total number of users or the number of sessions per user. An example of the frequency of access to session 0001 Introduction to e-learning for End-of-Life Care has a frequency of 76, indicating that the session was viewed 76 times. However, this does not specify whether the 76 views were from 76 different individuals or from fewer people viewing the session multiple times. Also, there are no statistical descriptors of the data (e.g., the standard deviation (SD) or the mean frequency of all sessions) because it would be essential to know whether the observed difference in the number of accesses between sessions (e.g., five logins to "0103 What do we mean by Body Language" vs. 65 to 01_01 Introduction to principles of ACP) are statistically significant or are just based on chance. Thus, though the frequency of logging in is a good measure of the most and least popular topics, it is essentially a shallow gauge of popularity. To further analyse learner behaviour, the data would need to be normalised against the user base, and sequences of access would be analysed to understand the routes and strategies learners use within the curriculum.

Comparing the number of completed modules with the total number of logins per course determined completion rates. The completion rate was highest for both eELCA 04 – Symptom Management and eELCA 05 – Integrating Learning, with both achieving a completion rate of 76%. Next, participants completed two sections: eELCA 10 – Specialist Content, which was completed by 70%, and eELCA 07 – Bereavement Care, with a rate of 67%.

Meanwhile, the Introduction to End-of-Life Care module has a 28% completion rate, suggesting that users either quit too early or found the introduction unclear. It appears that eELCA 01 and eELCA 02 did not achieve high completion rates (48% and 53%, respectively) (Table 4), indicating a need for improved user support or alternative organisations.

Table 4: Engagement and Completion Metrics for eELCA Training Modules

Course Title	Login Frequency	Completion Rate (%)	Median Time Spent (Range)
eELCA - Introduction to End-of-Life Care	150	28%	28 minutes (14 sec – 2h 12m)
eELCA 01 - Advance Care Planning	408	48%	35 minutes (10 sec – 1h 45m)
eELCA 02 - Assessment in End-of-Life Care	311	53%	48 minutes (12 sec – 10h)
eELCA 03 - Communication Skills	253	52%	42 minutes (12 sec – 6h 15m)
eELCA 04 - Symptom Management	160	76%	39 minutes (17 sec – 1h 47m)
eELCA 05 - Integrating Learning	33	76%	22 minutes (5 min – 1h 08m)
eELCA 06 - Social Care	23	52%	18 minutes (31 sec – 42m)
eELCA 07 - Bereavement Care	17	67%	24 minutes (10 min – 37m)
eELCA 08 - Spiritual Care	26	52%	29 minutes (11 min – 1h 31m)
eELCA 10 - Specialist Content	20	70%	25 minutes (8 min – 1h 11m)

The combined information shows a complicated correlation between access to the modules, completion and time investment. Although the most common module was eELCA 01 (Advanced Care Planning) (408 logins), the most common modules applied were eELCA 04 (Symptom Management) and eELCA 05 (Integrating Learning) (76% and 76% completion rates, respectively). This implies that an early interest does not necessarily result in completion and that modules that have a practical and focused outlook are possibly more likely to maintain interest. On the other hand, Introduction to End-of-Life Care both had the lowest completion rate (28%), and the highest frequency of logins (150), suggesting a severe bottleneck with high numbers of users starting the curriculum but failing to go further, possibly because of its general nature or low clinical applicability at the moment. The high completion rate of specialised modules, such as Bereavement Care (67) and Specialist Content (70), despite lower access, indicates a self-selected audience highly motivated to complete these modules, suggesting targeted and purposeful engagement.

While specific navigation sequences were not tracked in this summary, engagement behaviour indicates a general pattern: learners began with Introductory and ACP modules (e.g., 00_01, 01_01), then selectively progressed to legal/ethical (e.g., 01_05, 01_06) and communication-focused sessions (e.g., 01_11 to 01_16), highlighting personalised progression paths. These patterns are consistent with self-directed learning behaviour observed in other e-learning environments.

Table 5: Refined Participant Demographics

Parameter	Category	Percentage
Gender	Female	61.54%
	Male	38.46%
Profession (Consolidated)	**All Clinical Roles**	**89.19%**
	Doctor	48.65%
	Nurse	16.22%
	Pharmacist	10.81%
	Allied Health Professional*	11.00%
	Non-Clinical Roles	**10.81%**
	Administration & Other	10.81%
Primary Speciality (Doctors)	General Practice	13.51%
	Sports and Exercise Medicine	10.81%
	Acute Internal Medicine	8.11%
	Palliative Medicine	10.81%
	Accident & Emergency	10.81%
	Other Specified Specialities	16.22%
	Other / Not Specified	29.73%

Out of a total of 42 participants, 24 were female (57%) and 18 were male (43%). In terms of professional background, the largest group consisted of doctors, representing 43% of the sample. This was followed by nurses at 14%, pharmacists at 10%, and smaller groups that included psychologists, administrators, therapists, and chaplains. Regarding primary speciality areas, the most frequently represented field was General Medical Practice, with five participants. This was closely followed by Sports and Exercise Medicine, Palliative Medicine, and Accident & Emergency, each with four participants. Additional specialities included Acute Internal Medicine, Clinical Oncology, Public Health, and Critical Care (**Table 5**). Test results could not be analysed statistically due to the small group size, but patterns suggest that medical students comprise the majority of learners.

The study sample was composed mainly of females (61.54%), though 38.46% were male participants. To promote greater understanding in the analysis, professions have been grouped into broader, more significant categories. Such a recategorization shows that clinical professionals were overwhelmingly represented in the audience, the largest group of which was doctors (48.65%), then nurses (16.22%) and pharmacists (10.81%). The lower percentage was in allied health professions (11%) - which included psychologists, physiotherapists and music therapists - and the non-clinical areas such as administration and communications (11%).

Primary medical specialities can be analysed to explain the learner landscape further. Although a large percentage of doctors represented general practice (13.51%), what stood out was the overrepresentation of specialities that interacted with high-acuity patients, including sports and exercise medicine (10.81%), acute internal medicine (8.11%), and accident and emergency (10.81%). The specialists of palliative medicine, themselves, made up 10.81% of the cohort. The large Other/Not Specified category (29.73) suggests a potentially broad audience, including sub-specialists or non-medical specialists. This demographic profile shows that the eELCA curriculum covers a large group of healthcare workers, including generalists in need of basic knowledge and specialists working in high-stress settings and requiring improvement in their end-of-life care skills.

DISCUSSION

The present study provides a comprehensive explanation of the interaction between healthcare professionals and the eELCA palliative care curriculum, revealing specific patterns that depend on clinical relevance and content specificity. The number of logins on foundational units, such as Advance Care Planning and Assessment in End-of-Life Care, indicates a desire among learners to study material that is directly and practically applicable to their clinical work. This aligns with the literature, which suggests that healthcare professionals are drawn to e-learning materials covering core, high-yield competencies appropriate to their practices.

The high range in terms of minutes and hours of engagement, i.e., a couple of seconds and several hours, emphasises different approaches to learning. Although the short sessions may indicate specific information retrieval or disengagement, the long ones, particularly in complex modules like Assessment, suggest profound,

thought-provoking education or serve as a kind of just-in-time guide. This range of usage justifies the need for versatile content design, which can be either a short review or an in-depth study.

One of the most significant findings is the lack of correlation between module popularity and completion rates. Although the most visited one was Advance Care Planning, its completion rate was moderate (48%). Conversely, although more professional modules (Symptom Management and Bereavement Care) were not used as often, they had high completion rates (76% and 67% respectively). It means that general, general, and broad content captures a large audience. In contrast, more narrow and specific content keeps the attention of a self-selected audience, which would result in higher completion rates. The significantly low percentage of introductory module completion (28%) suggests that this may be a barrier to entry, possibly due to user orientation or the perceived short-term value of the module.

These results highlight that successful e-learning in palliative care should be able to meet diverse professional demands with both general and speciality content that is well designed and relevant to a wide range. To teachers, this means that high traffic does not necessarily imply high levels of learning; therefore, analytics should consider both access and completion measures. The work in the future must go beyond descriptive analytics to connect these patterns of engagement to performance outcomes that offer a more powerful metric of the educational effect on clinical competence.

CONCLUSION

This research provides valuable insights into how learners utilise the palliative care e-learning program. The current study is limited because it depends only on descriptive statistics. The lack of learners in the sample prevents us from studying the impact of their background or job on their activity in the system. Future research should employ statistical analysis to gain a deeper understanding of these aspects. A further issue is the lack of assessment of the outcomes observed in patients. Results indicate that healthcare professionals prefer basic modules such as Advance Care Planning and Assessment in End-of-Life Care. Even with different engagement times and success levels in each module, learners demonstrated that they were focused on achieving their goals by learning online. Another point the study highlights is the importance of creating e-learning materials that are helpful, flexible, and tailored to everyone's needs. Although the study had a small sample size, making statistical analysis impossible, the general data show how learners handle and complete their online palliative care courses. A more extensive impact of these programs can be achieved in future research by considering larger groups and analysing their differences in terms of demographics and professions. Linking the way learners interact with an online course to its outcomes in clinical practice would better assess the course's effectiveness. All in all, this study demonstrates that e-learning is beneficial in palliative care education and shows that the use of analytics can help guide and improve instruction tailored for healthcare experts.

Statement and declaration

Conflict of interest

No potential conflict of interest was reported by the author(s).

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Data Availability statement

The data used in this study are available with the manuscript.

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