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Author/s:
Prior Filipe, H;Paton, M;Tipping, J;Schneeweiss, S;Mack, HG

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DR HELENA PRIOR FILIPE (Orcid ID : 0000-0002-1081-7570)

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Microlearning to improve CPD learning objectives

Helena Prior Filipe[1, 2,3]* https://orcid.org/0000-0002-1081-7570

Morag Paton[4] ORCID https://orcid.org/0000-0002-9934-9784

Jane Tipping[4]

Suzan Schneeweiss[4]

Heather G Mack[5] https://orcid.org/0001-9756-1098

1 Department of Surgery (Ophthalmology), Hospital of the Armed Forces/PL-EMGFA, Lisbon, Portugal

2 Unit of Ophthalmology, Hospital SAMS, Lisbon, Portugal

3 Department of Medical Education, Faculty of Medicine, University of Lisbon, Portugal

4 Continuing Professional Development, Faculty of Medicine, University of Toronto, Toronto

5 Department of Surgery (Ophthalmology), University of Melbourne 3010 Australia

* corresponding author

Rua Sargento José Paulo dos Santos nº 8 1800-331 Lisboa. Portugal

Phone +351967061457

Email hpriorfilipe@gmail.com

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Abstract

Introduction

Despite active involvement in teaching, clinical educators facilitating continuing professional development of their fellow specialists may not have formal training in medical education. While required to write focused, measurable, topic relevant, attainable and time-bound learning objectives to clearly inform learners on their learning intentions, CPD educators often receive no training on how to develop them.

Microlearning is an online learning format occurring without real-time or inter-personal interaction, aiming to deliver easily accessible small units of focused information readily applicable by professionals.

We hypothesized that Portuguese ophthalmologist educators lecturing to their fellow specialists would benefit from a microlearning experience (MLE) to improve the quality of their learning objectives.

Methods

We created a MLE about writing effective learning objectives. In phase 1, 25 clinical educators, scheduled to lecture at an ophthalmology conference in Portugal, were invited to watch the MLE, write and classify their learning objectives according to Bloom's modified taxonomy and complete an evaluation survey. In phase 2, 86 clinical educators were invited to view the MLE and complete the survey.

Results

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In phase 1, 20% of participants completed the exercise and survey. They categorized their objectives high on Bloom's taxonomy, considered the MLE useful, and stated their intent to apply it in practice.
In phase 2, 29% of participants provided feedback. All agreed the intervention was clear and useful and 87% expressed intent to use the information in their educational practice.
Conclusions
The majority of participants found the MLE clear and useful. Further studies are necessary to measure the impact of MLEs used by clinical educators.

Introduction

Learning objectives are clear, concise, informative descriptions of what educators intend their learners to learn by the end of a learning experience. Medical education also speaks of learning *outcomes* in curriculum development [1] and the term is widely used in contemporary medical education. Learning outcomes express what was actually learned in a demonstrable and measurable way. In some countries such as Canada and Portugal where our investigation was held, learning *objectives* and learning *outcomes* are used interchangeably. The Royal College of Physicians and Surgeons of Canada, requires continuing professional development (CPD) educators to list learning *objectives* on their accreditation applications to "clearly map the direction of the content, how it will be presented, and the expected *outcome* for all parties involved".[2]

Studies demonstrate that traditional lectures aiming to update specialists on changes in clinical practice can be ineffective.[3] Légaré et al. demonstrated that the majority of CPD activities do not target higher order skills [4] according to Bloom's (modified) taxonomy of learning domains.[5] Written learning objectives most often fall within the lower levels of the cognitive domain as those of "remembering" and "understanding", instead of the higher levels ones: "applying", "analyzing", "evaluating" and "creating". Furthermore, few programs in this study targeted the affective or psychomotor domains.[4]

Designing CPD programs with learning objectives at only the lower levels of the cognitive domain may undermine the overall objective of CPD – to maintain and expand competencies of health professionals. Following best practice in adult learning, CPD initiatives should employ

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well-constructed learning objectives based on appropriate levels of Bloom's taxonomy to clearly inform the demonstrable and measurable outcomes intended.[6]

Generally, Portuguese ophthalmologist clinical educators tasked with CPD scientific program planning invite presenters to their programs or conferences on the basis of their subject-specific clinical expertise. CPD clinical educators usually range from full-time academic faculty to community-based practitioners and frequently have no formal medical education qualifications. [7]

Microlearning is an educational approach that delivers small focused units of learning through short-term activities and is used to teach a particular skill or area of knowledge, focusing on underlying concepts. These units are typically delivered online with no real-time interaction (asynchronously). The educational theory that supports microlearning is connectivism: the human capability to create connections between ideas, with each other, and with different sources of information. The definition and outcomes of microlearning in the context of health professions education is still under review.[8]

If CPD programming is to be more effective and ultimately promote practice change, CPD educators would benefit from the use of novel just-in-time teaching strategies such as microlearning. Continuing to design programs around poorly written learning objectives will only lead to the continuance of ineffective CPD interventions and failure to translate learning into clinical practice.

Our multicentric CPD educators' interest group developed and evaluated a microlearning experience (MLE) for ophthalmology clinical educators, aiming to improve the quality of their written learning objectives and provide a clear message on their learning intentions to their learners.

Methods

We developed our investigation in two phases. The first worked as a pilot experience. In an attempt to consolidate our research hypothesis, and given the small sample in the first phase, the

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simplified research protocol in the second phase allowed a significantly increased number of responses.

Phase 1: In March 2018, we invited 25 practising ophthalmology CPD educators, who had been invited to lecture at the annual meeting of the Portuguese Group of Cataract and Refractive Surgery (May 2018), to participate in this study. They were all practising clinical specialists voluntarily collaborating in their fellow colleagues' CPD as clinical educators employed as university faculty members or community-based clinicians. They were asked to view a 10-minute long online MLE entitled "Creating Effective Goals and Objectives"[9], then write, upload and categorize their lectures` goals and objectives according to Bloom's modified taxonomy, and lastly complete an online Google® form survey.

The survey in Table 1 was written by HPF and reviewed by two external experts in medical education before launch. It consisted of three sections: the first was to capture basic demographics of the participant group; the second was to evaluate the MLE and its applicability to practice in a series of 5 questions on a 4-point Likert scale; and the third used two open-ended questions aiming to assess: a) what they found most useful in the MLE and b) what they found could be improved.

Table 1

No participants asked for feedback about how they classified their learning objectives.

Phase 2: In the second phase of the study, the participant group broadened to include ophthalmologists' clinical educators invited by the Portuguese Society of Ophthalmology to lecture in CPD programs. A sample of eighty-six lecturers were purposively invited to view the MLE and complete the online survey. These participants were not asked to write or categorize learning objectives.

The study took place in Portugal. The online educational resource and survey were in English, however all communications between the principal investigator (PI) and the participants were in Portuguese. All non-respondents to the first invitation were sent one email reminder.

The learners who engaged in the programs led by both ophthalmologist educators' groups were not surveyed or had their learning outcomes assessed.

Data analysis

The data were analyzed using descriptive statistics.

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Ethics statement

This investigation was approved by the University of Toronto Research Ethics Board (Protocol #37736).

Results

Phase 1 study

Twenty percent of the participants (5/25) completed the exercise and the online evaluation survey. **Demographics:** All five participants (2 male and 3 female) stated they were invited to teach peers at the annual meeting because they were experts in a particular field. Forty percent claimed an academic career (university faculty).

Classification of lecture learning objectives: The participants wrote 20 learning objectives in total. Seventy-five percent were classified in the cognitive domain with the remainder in the affective domain. Participants classified their lectures' learning objectives at the higher levels of the cognitive domain of Bloom's taxonomy. The most commonly chosen levels were "Applying" (45%) followed by "Analyzing" (25%) and "Evaluating" (20%). Two participants (5% each) wrote learning objectives that they identified within the cognitive levels of "Remembering" or "Understanding". [Figure 1]

Figure 1

Evaluation: All participants considered their level of skill as fair at the start of the intervention and very good/excellent at the end. They stated they learned from the MLE to improve their educational practice. The participants agreed or strongly agreed that the instructor was effective and helpful, and the presentation was clear. When asked about the most valuable aspects of the program, participants indicated they learned that "certain skills may significantly improve communication", and "goals and objectives should be clearly defined". One participant indicated that the intervention was a "simple and interesting explanation", another suggested that more "examples and counter examples" would improve the experience.

Phase 2 study

Twenty-four respondents (24/86) watched the MLE and completed the evaluation survey.

Demographics: The sample comprised fourteen males and ten females. Nine participants primarily taught at the postgraduate level, 7 at the undergraduate level, and 5 primarily taught practising physicians. Twenty-two participants confirmed they were invited to lecture because they excel in a particular field of ophthalmology and fourteen held academic positions.

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Evaluation: Twenty-three respondents (96%) agreed and strongly agreed that the MLE message was clear and that the online resource would be helpful to create presentations with a clearer message. Twenty-one participants (88%) agreed and strongly agreed on their intention to consistently use it in their teaching practice. Three participants disagreed, one claimed that material was not relevant and two said that "I see myself highly competent already". All participants agreed and strongly agreed (79% and 21% respectively) that the MLE was useful and agreed and strongly agreed (67% and 29% respectively) about recommending it to a friend. [Figure 2]

Figure 2

Participants (eighteen responses) expressed a number of benefits of the MLE, including that the program "help[ed] to communicate the message", served as a "guideline", and provided "new concepts and list of actions". Participants indicated three areas for improvement: - one found the program to be "too formal"; -one noted that it had "too much detail";- and similar to phase 1, one participant recommended "more examples".

Discussion

Microlearning as a format of short online modules delivering small units of focused information may be effective in teaching just-in-time educational strategies useful for the busy clinical educator. There is scarce research on the effectiveness of microlearning in medical education and less in CPD.[7] Our study suggests that a) clinical educators accepted well the value of creating effective goals and objectives; b) clinical expertise is valued over teaching skills in invitations to teach in CPD; c) participants were eager to improve their teaching skills; d) microlearning, and this particular MLE was well accepted by CPD clinician-educators to enhance skills in developing learning goals and objectives.

The need to simplify our investigation protocol used in phase 1 to broaden our sample is a limitation. This study captured self-reported data and did not explore if participants applied what they learned from the MLE. Furthermore, there was a low number of respondents, although our response rate is typical of internet surveys.[10] Participants were Portuguese ophthalmologists, and the results may not be directly applicable in other clinical settings and countries.

This is one of few studies seeking to prospectively create and classify CPD activities according

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to Bloom's modified taxonomy, encouraging future research in how to translate education theory into practice. The disparity between the self-classified lectures' learning objectives within the cognitive high levels of Bloom's taxonomy found in phase 1 and Legaré's investigation[4] which primarily categorized objectives at the lower levels, leads us to conclude that microlearning experiences such as this may be an effective format to encourage higher levels of learning in CPD. The possibility that the presentation of Bloom's taxonomy in the MLE may have led participants to write higher-level objectives suggests an interesting path to continue investigating.

Exploring microlearning as an educational method in larger studies, particularly replicating the intervention in different clinical settings and languages, using different assessments of the intervention and in longitudinal programs prompts an intriguing field of research.

Conclusion

Microlearning can be an effective method to support CPD clinical educators seeking to improve their written learning objectives, and communicate a clearer message of what they intend their learners to learn.

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Table 1

Section 1 Demographics	
1	Gender
2	Year of graduation as a doctor in medicine
3	Who do you mostly teach?
4	Are you invited to talk because you master a particular knowledge/skill in ophthalmology?
5	Do you have a role/responsibility in Academia/University?
Section 2 Microlearning experience review	
1	The message of the online resource is clear
2	The online resource will help me to create my presentations with a clearer message
3	I intend to use the online resource information on a consistent basis in preparing my future presentations
4	This module was useful to me, as an instructor
5	I would advise this online resource to a friend
6	Regarding question 3 in the previous section, please select all that applies, in case you have chosen "disagree" or "strongly disagree"
Section 3 The “most useful” and “opportunities to improve” in the microlearning experience	
7	What did you find most valuable in this online resource? And least?
8	How would you improve this online educational resource?
I consent for this data to be solely used for educational/academic purposes, considering that my identity is safeguarded.	

Table 1. Survey questions for participants, after watching an online microlearning experience on writing learning objectives. [Authors’translation from Portuguese]. Questions numbers 1 to 3 required to select one from a Likert scale: 1-Strongly agree, 2-Agree, 3-Disagree, 4-Strongly disagree. Others were open answer questions except

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from question number 6 (the only one not mandatory to answer) that offered four checkbox options: 1. I don't find the material relevant, 2. I see myself as highly competent already, 3. Others.

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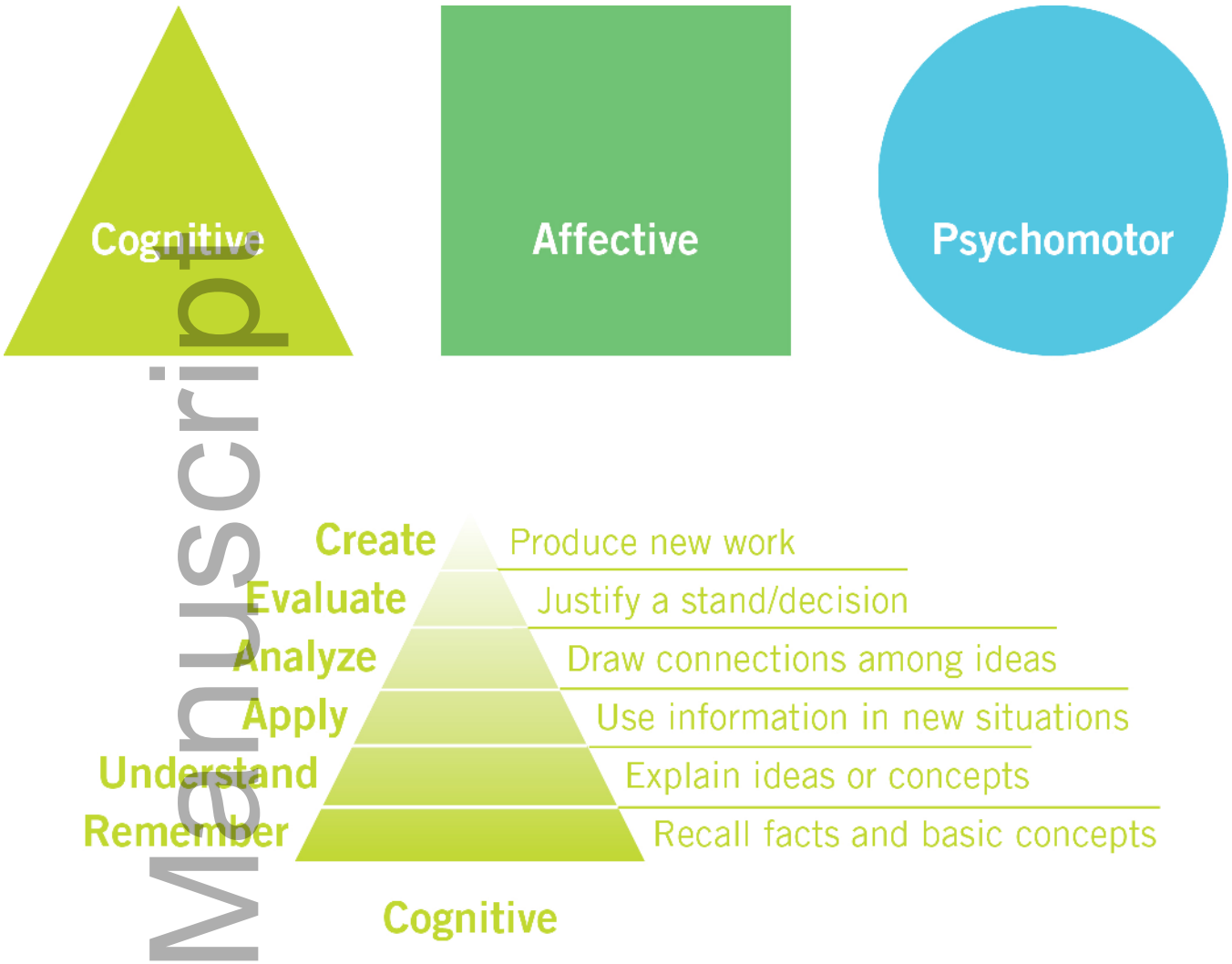

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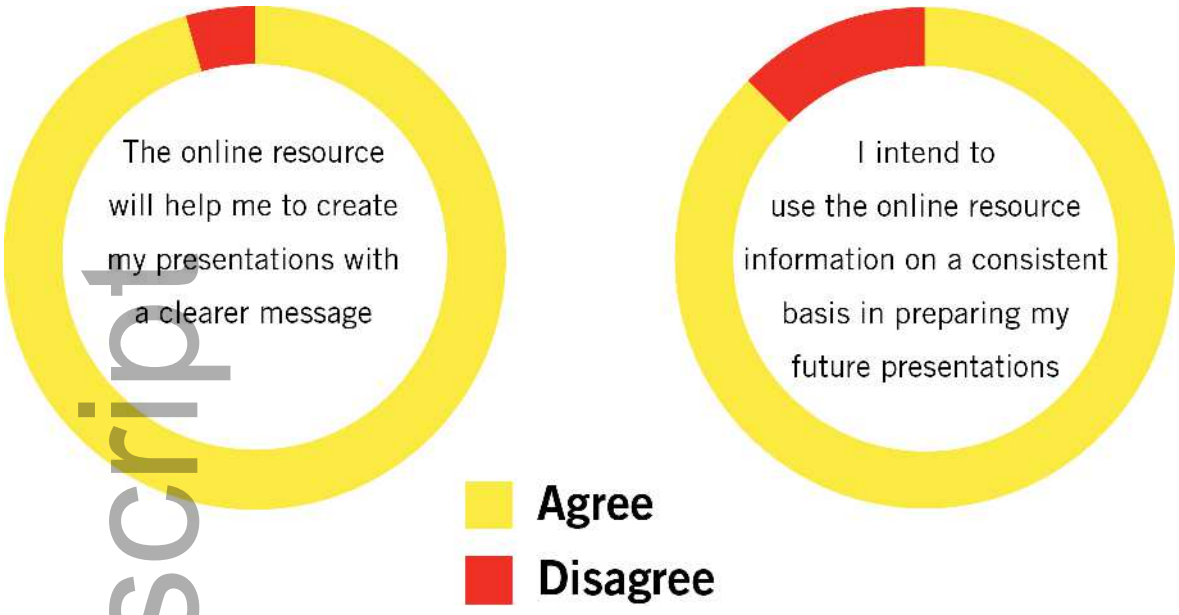

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