Technische Hochschule Brandenburg
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Scan to Learn: A Lightweight Approach for Informal Mobile Micro-Learning at the Workplace

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Scan to learn: Agenda

1 Background
- Informal workplace learning
- Mobile Micro-Learning (MML)

2 Research question

3 Examples of MML at the Workplace

4 A Lightweight Approach
- Suggestions for Design and Implementation
- Proof of Concept

5 Conclusions

What is informal workplace learning and why is it so important?

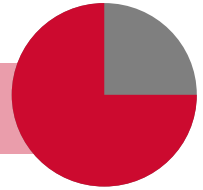
Informal learning at the workplace[A] means:

- learning outside a prescribed learning framework (no organized event or package)
- without a professional trainer
- embedded ("situated") in daily work routines ("learning in work")
- initiated by workers, often triggered by "an internal or external jolt" (self-directed)

Typical activities[A]:

- Interaction with others ("social learning"): observing, seeking help or feedback from others, discussing
- Self-initiated study, practice or experimentation ("learning by doing"): trial and error, reflecting or searching the intra- or Internet for information

Informal learning at the workplace = crucial for updating and upskilling today's workforce





6 examples for workplaces where informal learning opportunities are scarce



Challenging settings for informal workplace learning

- **Little direct interaction** between workers (e.g., decentralized work settings, but also highly mechanized settings and work environments with noise or high language diversity among workers)
  - ↓ Learning by observing, asking questions and receiving feedback ("social learning")
- **Little autonomy** due to **tight schedules** or **high degrees of automation**
  - ↓ Experimentation on-the-job and self-directed learning activities in general
- Jobs **without** permanent **access to a stationary desktop computer**
  - ↓ self-directed learning with codified organizational or external knowledge (e.g., Internet)

Such "learning-deprived" workplaces typically suffer from reduced speed and intensity of informal learning at the workplace and jeopardize workforce upskilling.

Conceptual overlap between MML and informal learning at the workplace

(Mobile) Micro-learning[B]:

- short learning nuggets (1-5 minutes)
- focused on one narrow topic
- provided in rich, interactive media formats
- most often consumed on mobile handheld devices
- undertaken just-in-time ("on demand") and consumed anytime and anyplace
- positively affecting learners' motivation and knowledge retention (cognitive load↓, repetition↑)

Given its characteristics, MML seems to be an appropriate approach for informal learning at the workplace.

Research question

Research gap:

- In many learning-deprived work settings, knowledge or skills needed to continue one's work or to start with learning-by-doing would not require extensive educational content, but rather a little tweak.
- Learning based on bite-sized learning nuggets (= micro-learning or Mobile Micro-Learning, MML) may be a means to improve work-related learning in learning-deprived environments.
- However, there are currently almost no applications of MML for these specific work settings.

Research question: How can we successfully implement MML to enhance informal work-related learning in learning-deprived fields?

Good Practices: Mobile Micro-Learning to foster informal workplace learning

- Researchers and practitioners highlight the **potential of MML** for just-in-time learning, but also for the effective and efficient onboarding of new employees or for occupational safety and compliance training (e.g., Walmart).
- Recent applications cover a **wide range of work settings** (e.g., health and medical care, ITC, hospitality sector, public administration, dairy farms, childcare workers)
- However, the majority of scientific evaluation studies on MML applications for workplace learning were **conducted in an educational setting**, only.
- **Six recent studies** were selected to gain insights about **good practices in MML**: published not later than 2020, scientific evaluation in a real-life work setting, detailed information about implementation, short learning nuggets (<5 min), use of rich, interactive media.

Good Practices: Mobile Micro-Learning to foster informal workplace learning

Selected MML Studies in Real Workplace Settings

Study	***Country (no. of learners)***	***Topic and learners***
S1 Hegerius et al. 2020	>100 countries (N>2000)	Pharmacovigilance (pharmacists, medical doctors, others)
S2 Beste 2020	Norway (N=334)	Cost-efficiency in construction projects (project managers, engineers, architects and other)
S3 Matsumoto et al. 2022, 2023	Japan (N=62)	Dementia-friendly customer care" (employees in neighborhood convenience stores)
S4 May et al. 2021	Australia (N>2000)	Clinical care and no-clinical topics (nurses, medical staff, non-clinical staff)
S5 Dyrbye et a. 2022	USA (N/A)	Teaching skills and learning science (faculty at academic health centers)
S6 Robalino 2021	USA (N=26)	Point-of-care training for high-risk, low volume therapies (nurses)

Good Practices: Mobile Micro-Learning to foster informal workplace learning

Specific learnings from the studies:

- S1-S3: MML as the little brother or sister of e-learning, prescribing a learning path with sequentially aligned modules and quizzes (low degree of self-direction in learning, lack of anchoring in work context)
- S4, S5: Design of self-contained learning nuggets based on a blueprint; provision via a web-based index of self-containing learning nuggets
- S6: Access to learning nuggets based on QR codes in the physical work environment (on demand, self contained) is a promising approach for self-directed, on-demand learning

(very) short learning nuggets, often based on videos or text-based information

Open issues for MML applications in learning-deprived settings:

- Verbal comprehension as a crucial prerequisite for this kind of MML
- Little focus on practice, experimentation and reflection

A lightweight approach: The learners‘ perspective

The four principles for MML design by Jahnke et al. 2020[C] and suggested adaptations

- MML content should fit on the small screens of mobile devices.
- MML should address learners in the moment they feel the need to learn something and have to be short enough to do so (no longer than 5 minutes) – in our setting even shorter (1-2 min, only one single specific question arising from work)
- Suggested instructional flow: Information snippet to provide an aha moment about the relevance (step 1), instructional snippets with short exercises (quizzes, micro games, ideas for practice and experimentation at the workplace) and instant feedback (step 2). They should also contain practices for reflection, and be fully self-contained.
- MML content should be designed in a way that triggers interaction between the learner and the content (e.g. using practical and/or gamified activities). QR codes affixed to work equipment and locations can link to useful learning nuggets. Animated videos or visual, interactive work aids should be preferred over text-based and verbal information.

A lightweight approach: The company perspective

The authoring tool for learning content should be easy to use

- Time constraints or lack of technical skills of learning managers or infrastructure issues should not hamper the implementation of MML
- Content types should support the instructional scheme suggested in the design principles

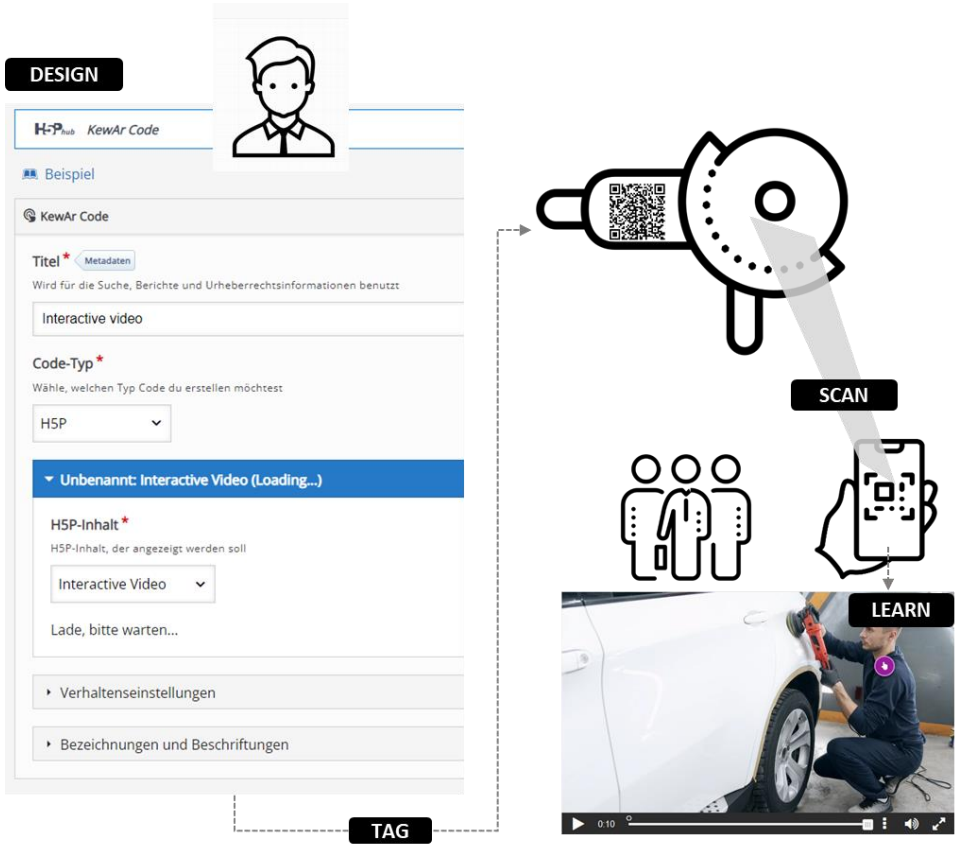
A secured platform to manage, store and distribute learning nuggets is needed

- Common Learning Management Systems (LMS) offer the needed functionalities
- The investment for introducing a fully-fledged LMS for MML might be too high (in particular for SME). A simple CMS may be good alternative.

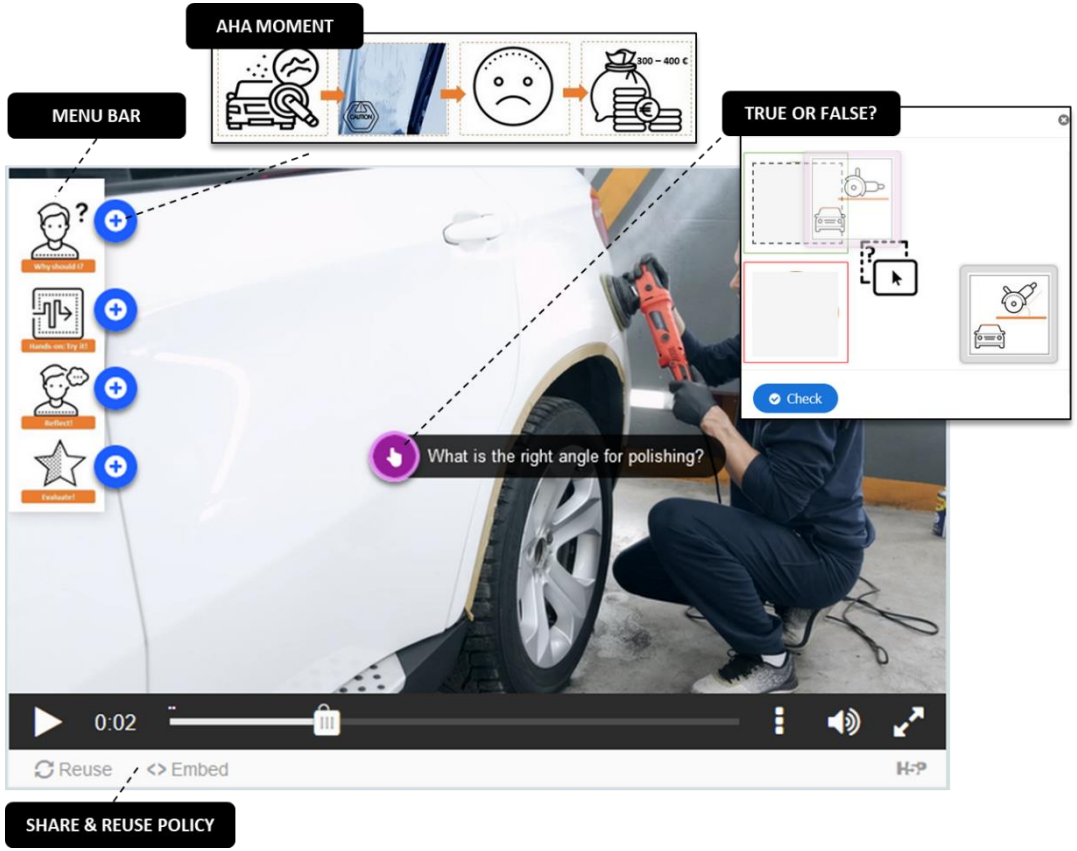
Idea: Use H5P (free and open source, easi(er) to use, comes with interactive formats that fit the instructional flow) and integrate into a simple CMS such as WordPress

A lightweight approach: Proof-of-Concept

(a) Scan-to-Learn-System



(b) Example for learning nugget



Conclusions

- Bite-sized learning via mobile devices (MML) can be a **powerful means to enhance informal work-related learning** also in learning-deprived fields – albeit it still does not sufficiently enhance social learning.
- Successfully introducing MML in learning-deprived work settings **requires adapting existing principles for design and implementation**
- The suggested **lightweight approach** based on a website with WordPress CMS, H5P interactive technology and QR codes are one option to lower the barriers for the design, the distribution and the use of short but engaging MML nuggets
- **Future directions**: Implementation study in selected companies; marker-based mobile AR as upcoming trend

References of studies 1 – 6

S1: A. Hegerius, P. Caduff-Janosa, R. Savage, and J. Ellenius, "E-Learning in Pharmacovigilance: An Evaluation of Microlearning-Based Modules Developed by Uppsala Monitoring Centre," Drug Saf, vol. 43, no. 11, pp. 1171–1180, Nov. 2020.

S2: T. Beste, "Knowledge Transfer in a Project-Based Organization Through Microlearning on Cost-Efficiency," The Journal of Applied Behavioral Science, p. 00218863211033096, Jul. 2021.

S3a: H. Matsumoto, Y. Hagiwara, N. Yamamoto-Mitani, and A. Igarashi, "A randomized control trial for ReDeSign: A dementia-friendly mobile microlearning training for store workers in Japan," The Gerontologist, vol. XX, no. XX, pp. 1–11, 2023.

S3b: H. Matsumoto, A. Igarashi, Y. Hagiwara, and N. Yamamoto-Mitani, "Relational Design for Dementia and Job Significance (ReDeSign): Study protocol for a randomized controlled trial of an online dementia training for retail workers," Contemporary Clinical Trials Communications, vol. 26, p. 100896, Jan. 2022.

S4: N. May, J. Young, and L. Gillman, "Take 5: Designing and evaluating 5-minute eLearning for busy hospital staff," *Focus on Health Professional Education*, vol. 22, no. 2, pp. 60–71, May 2021.

S5: L. N. Dyrbye, A. L. Bergene, A. N. L. Hunderfund, and H. A. Billings, "Reimagining Faculty Development Deployment: A Multipronged, Pragmatic Approach to Improve Engagement," *Acad. Med.*, vol. 97, no. 9, pp. 1322–1330, Sep. 2022.

S6: M. Robalino, "Intervention Development: Quick Response Code Implementation for Point-of-Care Training Needs in the Emergency Department," *Journal of Emergency Nursing*, vol. 47, no. 6, pp. 938–943, Nov. 2021.

Footnotes

[A] Definition of informal learning based on:

A. Manuti, S. Pastore, A. F. Scardigno, M. L. Giancaspro, and D. Morciano, "Formal and informal learning in the workplace: a research review," International Journal of Training and Development, vol. 19, no. 1, pp. 1–17, 2015..

M. Le Clus, "Informal learning in the workplace: A review of the literature," Australian Journal of Adult Learning, vol. 51, no. 2, pp. 355–373, 2011.

[B] Definition of Mobile Micro-Learning (MML) based on:

J. Thillainadesan, D. G. Le Couteur, I. Haq, and T. J. Wilkinson, "When I say … microlearning," Med Educ, vol. 56, no. 8, pp. 791–792, Aug. 2022.

T. Hug, "Mobile Learning as 'Microlearning': Conceptual Considerations towards Enhancements of Didactic Thinking," International Journal of Mobile and Blended Learning, vol. 2, no. 4, pp. 47–57, Oct. 2010.

Y.-M. Lee, "Mobile microlearning: a systematic literature review and its implications," Interactive Learning Environments, Sep. 2021.

[C] Jahnke, Y.-M. Lee, M. Pham, H. He, and L. Austin, "Unpacking the Inherent Design Principles of Mobile Microlearning," Tech Know Learn, vol. 25, no. 3, pp. 585–619, Sep. 2020.