

A Socratic E-Learning Approach

<http://dx.doi.org/10.3991/ijac.v8i2.4442>

M.H. Snaprud^{1,2} and G.R. Helmikstøl²

¹ Tingtun AS

² University of Agder, Kristiansand, Norway

Abstract—Using questions to elaborate knowledge, is widely used in learning today. In this position paper we argue that there are new benefits to reap from using ICT in a learning process based on the Socratic method, and outline practical steps of an approach for collaborative e-learning using questions.

Index Terms—e-learning, questions

I. INTRODUCTION

Successful learning activities rely on efficient ways to build insights and skills. Digitization bears the promise to radically improve efficiency both for teachers and learners. The potential of this promise is indicated in well known examples like [Wikipedia](#) where knowledge is collaboratively created and shared globally or in more targeted learning portals like [Kahn Academy](#) or [MIT OpenCourseWare](#). The language discipline seems currently to be the most advanced using ICTs for learning with examples like [Duolingo](#).

In our teaching context from the University of Agder in Norway we use the ICT in teaching mainly for course administration and only to a very limited extent for the actual teaching and learning. At the same time we note that many students have much more advanced uses of ICTs for leisure and social activities.

II. A MISMATCH IN NORWAY

In Norway 95% of the population was using the Internet on a weekly basis in 2014 [1] and 64% of the population actively use social media. This is the second highest adoption in Europe only preceded by Iceland with 97% regular Internet users and 70% on social media [2]. In addition Norway has the third highest spending on education among OECD countries [3].

Despite this promising basis for e-learning adoption, the current use of ICTs in schools and in higher educations is mostly limited to the basic functionality provided in learning management systems to inform the students about the course contents and schedule, and to manage students assignments. There are some notable exceptions including MOOCs initiatives (Massive Open Online Courses) and quiz applications like [Kahoot](#).

The main reason preventing Norwegian teachers from using more ICTs for teaching is reported to be their own limited ICT skills [4].

III. COLLABORATIVE LEARNING AND THE USE OF QUESTIONS

Learning can be a social activity where knowledge is created in a dialogue among people. In this way, knowledge is shaped through practical activities where

groups of people interact within a cultural community. This social-constructive view was introduced by Vygotskij in 1934 [5].

Our approach is based on this view where learning happens both individually for personal knowledge acquisition, and collaboratively in the interaction with others in a group in school or in the wider societal context.

In a socio-cultural learning perspective the focus will be on the mediated learning. This mediation means that any human action is seen in the context of the historical and culturally developed artefacts (tools) [5]. The artefacts are physical and intellectual tools such as PC, the Web, or software. Thereby, tools elaborated in a historical and cultural context, constituting integrated parts of our social practices, such as learning materials in higher education.

In the theory of constructivism the focus is on social mediation of the individual learning. This mediation is characterized by intensive interaction, rapid feedback, personal and context aware mediation and encouragement. The learner will explain and suggest solutions instead of receiving corrections or the correct answers from the trainer.

Approaches using questions to infer and to access knowledge are used in many domains. In engineering, questions in a fault analysis tree can be used for trouble shooting. Similarly, in medicine, questions are used to determine a diagnosis for treatment. Such established trees can also be used for learning.

A wealth of online Howto's for various technical topics like how to configure the Linux Debian distribution are published. Many of the Linux HowTo's are collected under the Linux Documentation Project (LDP)[6].

An other common and large area of application is to use questions for crowd sourcing both of questions and of answers, for example [Stackoverflow.com](#). Such systems also often have mechanisms to assign scores to answers and to users. Further examples include sites like [answers.com](#), [eHow.com](#), or [wikihow.com](#).

Socrates used questions to lead others to deeper insights, today known as the «Socratic method». This is helpful to stimulate critical thinking and aid discussions to eliminate hypotheses and arrive at a commonly held truth. More recent work on questions in learning is and critical thinking is explored in [7], [8] and [9].

To enable more teachers to reap more benefits from ICTs with a minimum of additional training, we propose to use questions and answers in a digitalised and collaborative learning process to support the learning process and to furnish a novel access to knowledge.

In the following sections we list a selection of existing applications where questions are used as entry points to knowledge, followed by an outline of our proposed ap-

proach, the expected impact and some concluding remarks on the proposed further research and deployment.

IV. THE PROPOSED COLLABORATIVE FAQ APPROACH

Our approach consists of steps for teaching and learning supported by tools to manage Frequently Asked Questions (FAQs).

The approach can be adapted to suit different types of courses and styles. For example using reflection notes from a pedagogics course, log notes from an ICT course, or a set of terms to from a language course.

Independent of course domain we suggest that one of the first lectures will introduce two Word clouds. The progress throughout the course is shown by moving words from the cloud with terms yet “to learn” to the cloud with the “learned” terms.

Each individual student and each group of students has a similar pair of Word clouds to work on as they learn. The learning is connected to the process to prepare questions and answers attached to terms to learn. The questions and answers can subsequently be edited and commented.

The tool will mainly support two entry points

- full text search of the FAQ lists, and other indexed content using an arbitrary search phrase.
- selection of a word in the word cloud to
 - view or edit the associated questions
 - to access other associated sources

We may want to add additional entry points later if deemed helpful.

The steps of the proposed process are

1. Select key terms needed to understand the subject. A first set of terms may be generated as a Word cloud from the course learning outcomes.
2. Place the terms into two boxes representing the categories to learn or learned (individually).
3. Link terms in word cloud to the search results of the term (tool supported).
4. Create questions related to terms yet to learn. To facilitate the creation of the questions the students will be guided to create “wonderment questions.”
5. Discuss in forum online and offline to arrive at answers to questions, with teacher support.
6. Consolidate questions with the teacher and among the groups. The teacher comments on them to clarify any misunderstandings.
7. Find/create additional examples for difficult topics.
8. Repeat above steps as needed to move all the terms from the to learn- to the learned box.

All questions should be formulated to fit into the learning goals of the course. Important questions which do not fit in can be passed on to an other course or routed to some other recipient who may be able to answer.

The students can also be asked to prepare related questions where they are not able to provide the answers. These questions can be used to determine the learning progress and for adjustments of subsequent lectures in the course.

We propose to introduce the approach as a small follow-up component for existing courses with traditional

lecturing format. The component could for example replace one small exercise for the students.

V. EXPECTED IMPACT OF THE APPROACH

A. Benefits brought by e-learning

An important side effect of the approach is the digital lecture notes created in the form of Word clouds and FAQ records. This content can be exported and reuse in other context and to connect to other sources e.g. prepared by others.

The digital format can support more efficient ways to locate, process, share and reuse the data. ICT can support the automated linking of terms to definitions, questions, examples, related earlier exams etc. We have an experimental implementation based on the [Tingtun Search engine](#). Figure 1 shows an example for a search among all the questions related to WCAG (Web Content Accessibility Guidelines). The demo is available at [faq.tingtun.no](#).

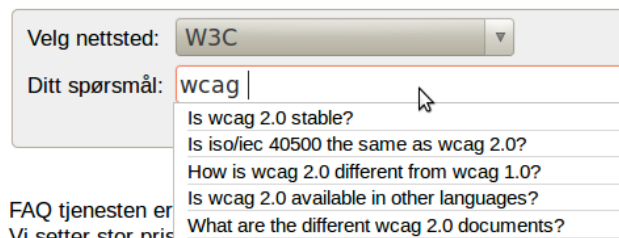


Figure 1. Example search among questions related to the term WCAG.

The FAQ tool already has some of the features needed such as the ability to group similar questions, and to generate a word cloud.

Further benefits is the ability to store and retrieve FAQ records, term definitions and the Word clouds. The search engine used is already able to handle categories of search hits. In practice this means that a the search results from one search will be presented under multiple tabs representing the categories (e.g. textbooks, FAQ records, and term definitions)

The planned capability to represent versions of the content can be used as hand-ins to be commented by the teacher.

The tool could also support comments from fellow students and from the teacher. Integration with other existing tools to draw mind maps, run a quiz or spaced repetition applications (SRS tools) can also be helpful.

B. Student benefits

The approach is expected to give a stronger ownership for the students to their own learning materials and better access to them later. Having the students create their own questions is expected to deepen their insights of the topic and to encourage their curiosity in line with the Socratic method. Questions created by students can fill the gap between learning materials and the learning needs.

The filling of the learned cloud with new terms throughout the course should give the students a better understanding of the own learning progress.

The students will learn how to better use digital tools for learning and for subsequent access to the prepared lecture notes and other materials.

POSITION PAPER
A SOCRATIC E-LEARNING APPROACH

C. Teacher benefits

For the teacher the questions from the students will give early indications of where the students are in their learning and what they have learned from previous courses. The teacher can prepare the scaffold for individual students or groups. Enable the teachers to design the scaffolding to better fill the gaps in the students understanding.

Identify the weak spots in the learning materials and/or the presentation of the material.

The students questions may raise new exciting topics of interest for research.

VI. DISCUSSION

Efficient ways to learn becomes increasingly crucial with the rapidly growing body of knowledge and information. The approach indicated in this paper can lay the ground for further experiments to explore more efficient ways to teach and to learn using ICT.

To refine the approach into a methodology and improve the experimental tools for wider deployment we suggest to set up an a deployment to identify weaknesses.

Questions to address for deployment include how to best guide the students using ICT tools to create helpful questions for learning, and how to use this approach related to the student exams.

Since many teachers are lacking essential ICT skills we suggest to introduce a small step with a large potential.

Efficient access to the personal digital "lecture notes" will enable students to faster find back to their own already established insights when they need them after the graduation.

To conclude this position paper we would like to pose a question: What do you think Socrates would have done given ICTs like we today?

ACKNOWLEDGMENT

We would like to acknowledge all the good comments and technical input from the collaboration with the munic-

ipalities partnering in the eFAQ project, and the colleagues at Tingtun making this paper possible. The interaction with partners of the EIII project has also been an enabling source inspiration.

REFERENCES

- [1] Eurostat web penetration overview <http://ec.europa.eu/eurostat/tgm/table.do?>
- [2] Active social media penetration in European countries in February 2014, [1]<http://www.statista.com/statistics/295660/active-social-media-penetration-in-european-countries/>
- [3] Overview of PISA results for Norway <http://www.oecd.org/pisa/keyfindings/PISA-2012-results-norway.pdf>
- [4] Postholm, M.B., Haug, P., Munth, E., Krumsvik R.J. (2012). *Lærere i skolen som organisasjon*, Cappelen Damm, Høyskoleforlaget, Kristiansand, Norway.
- [5] Vygotskij, L. (1934). *Thinking and speech*, The M.I.T. Press, 1962; For online version see <https://marxists.org/archive/vygotsky/works/words/index.htm>
- [6] http://en.wikipedia.org/wiki/Linux_Documentation_Proj
- [7] Chin, C., & Brown, D. (2002). Student-generated questions: A meaningful aspect of learning in science. *International Journal of Science Education*, 24(5), pp 521-549. <http://dx.doi.org/10.1080/09500690110095249>
- [8] Rosenshine, B., Meister, C., & Chapman, S. (1996). Teaching students to generate questions: A review of the intervention studies. *Review of Educational Research*, 66(2), 181. <http://dx.doi.org/10.3102/00346543066002181>
- [9] The Critical Thinking Community, official website; www.criticalThinking.org

AUTHORS

M. H. Snaprud, is the CEO of Tingtun AS, PO Box 48, 4791 Lillesand. and teaches ICT at the Faculty of Science and Engineering at the University of Agder, Norway (mikael.snaprud@tingtun.no).

G. R. Helmikstøl, teaches at the Faculty of Education at the University of Agder (gerd.r.helmikstol@uia.no).

This work was supported in part by the Research Council of Norway for the eFAQ project under the grant 230216/O70, and in part by the European Commission grant no. 609667 for the EIII project. Submitted 01 February 2015. Published as resubmitted by the authors 02 June 2015.