

Method Matters: Reflections from Student-Made Mapping Studies

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Abstract—This Research to Practice full paper reviews two student-made *systematic mapping studies* and has two goals. The first goal is to report the students' and the supervisor's experiences with this research method, and thereby contribute to practice and knowledge on student research. A mapping study was experienced to fit a situation where the student initially had no personal research interests. Moreover, the method was argued to be appropriate for technology-related disciplines where student identities readily match with the pedantry required. Such student reflections suggest that rewarding research experiences can arise from an initially open starting point, and by considering student background in relation to the nature of work with a particular research method. Supervisors should hence learn about their students' identities when proposing research methods—method matters. The second goal is to disseminate the results of the two mapping studies. The other study mapped *intellectual property* as an educational research topic, while the other focused on *creative coding*, similarly as an educational topic. The main results of these studies are summarized and explanation for how the results demonstrate acknowledged benefits of professional mapping studies is provided.

I. INTRODUCTION

Involving students in research can take multiple forms. Healey [10] illustrated this through a two-dimensional framework. One dimension was the degree of student participation, that is, whether students are involved as authentic participants or as an audience. The other dimension was the emphasis on either research content or the research processes and problems: When selecting student participation from the first dimension and the research content from the second dimension, focus is on academic research (papers) written by students. When instead selecting processes and problems from the second dimension, focus can be seen on a curriculum wide mimicking of research, e.g., through inquiry-based pedagogies. The present article principally reflects the condition of students preparing academic research.

This article reviews two cases of student-made systematic mapping studies with a twofold goal. The first goal is to report experiences of the applicability of a systematic mapping study as a methodological approach to student research from both the supervisor's and the students' perspectives. The students, Sari and Niko, co-author this paper. We are hence reporting

autoethnographic accounts¹ by returning to aspects that occupied us concerning the two student research undertakings. One motivation was the toilsomeness acknowledged in systematic literature studies [20]; plausible application to student work is non-trivial. Another motivation was that we could not find studies specifically focusing on selection and application of a particular method in student research. Documenting student research processes informs others, given that methods applied in computing are numerous and a thorough introduction of them to students is thereby difficult.

The second goal is to disseminate the results of the two studies. Sari studied how the topic of *intellectual property* (IP) had been addressed in SIGCSE computing education research community (annual conferences) [22], and Niko looked at how and where *creative coding* had been studied in educational settings during a five-year period. These original master theses are currently available in Finnish in the University's digital archive, and hence do not widely reach their important audiences. We summarize their main results, and point to further information in tables and appendixes in the original theses, which should be accessible to an English reader. Dissemination is a key consideration for a systematic literature study [15]. In this regard, the present paper concludes these two student research projects. The contribution is argued to be in our authentic commentary about the method, as well as in the results of the mapping studies hereby shared.

Section II reviews literature on student research. Section III provides an overview of a systematic mapping study. Section IV summarizes the processes and results in the two cases. Section V advances our experiences, the autoethnographic accounts of selection and usage of systematic mapping in student research. The paper is summarized and implications are outlined in Section VI.

II. STUDENT RESEARCH

The first theoretical framework for this paper is student research. In introduction, Healey's [10] framework was mentioned. Jenkins and Healey [12] later argued for a thorough

¹'Autoethnographic account' was the label given to a study in which an academic and students elaborated a narrative on a particular topic [8]. The present study does not present a full autoethnographic study but has an empirical component in a similar sense.

inclusion of student research in curricula through inquiry-based study. They contemplated that the extent of the inclusion of research is a political question, and took a position that higher education should allow students to process knowledge in a research-like manner, as compared to passive information acquisition. The challenge they raised was that intended inclusion does not often materialize. The authors referred to selectiveness, that research activities tend to be selectively provided to capable students and otherwise remain marginal.

In a study by Partridge and Sandover [19], student agreed that participation in research developed their problem-solving and communication skills, and allowed them to relate to “big picture.” The key issue these authors raised was that student research should be more than a mere tokenist activity performed for a professor. The authors stress that the research topics should be relevant to both students and wider audiences, and that students should experience ownership of their research. To properly define intended student research, they referred to the Beckman’s and Hensel’s [3] framework and guidelines. These guidelines encourage planning on the nature of student contributions and intended audiences, for instance. Other key actions Partridge and Sandover emphasized were the focus on research methods teaching and supervision during research activities.

Burgoyne et al. [5] observed that research activities remained remote to medical students within their university, although students generally acknowledged the importance of research in their praxis. Another study by Wilson et al. [24] reported that the perceptions of academics about undergraduate student research programs vary. Who are considered to be the beneficiaries of undergraduate research influenced these perceptions. When the beneficiaries were considered to be the academics themselves or the university, students research was associated with selection and retention. When student learning was seen as the most beneficial feature, student research was associated with research enculturation.

Scholarly texts on developing students’ academic writing skills arguably overlap with the studies on student research. This line of research stresses capacity building [2], holistic identity development [7], and “acculturation” [9]. Badley [2] conceptualized student development in a way that the student needs to learn to “de-construct” academic texts to be then able to “re-construct” them. This conveys that writing (re-construction) involves reading (de-construction). Badley continued that the development of student writing can extend to the level of “re-shaping” where student writing extends and departures from prevailing conventions in an informed manner.

The observations above indicate gaps in how students are involved in research, while pointing to educational benefits of student research. Holistic, for-all inclusion of student research in curricula has been argued for, and gradual capability development of students has been considered important.

III. SYSTEMATIC MAPPING STUDIES

The second theoretical framework for this paper is the guidelines for secondary, systematic literature studies, in par-

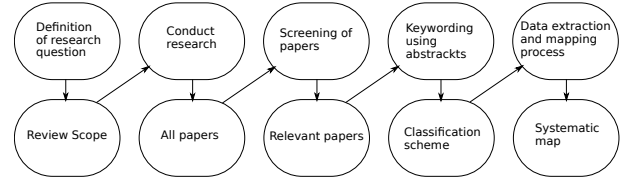


Fig. 1. Mapping process according to Peters et al. [20]: The upper row depicts the process steps and the bottom row their outcomes.

ticular concerning ‘mapping.’ Systematic literature studies are common in fields that emphasize evidence-based practice, such as medicine, and they have become increasingly popular in software engineering as well [20]. A systematic mapping study exemplifies a *secondary* study, as it utilizes existing *primary* studies as its data; see glossary in [15]. A mapping study is said to closely relate to a systematic literature review (SLR). However, a mapping study focuses on broader questions intending to depict or map a particular research area, e.g., by illuminating research types of the publications over a particular time frame. SLR rather focuses on specific questions, seeking to synthesize evidence. See [15], [20]. A mapping study can be a useful step toward SLR and another kind of studies, or create a contribution on its own [21]. Regarding the former, a mapping study allows for identifying related work and clusters for further study [16]. Regarding the latter, researchers gain valuable overviews by mapping studies [16].

Both student studies relied on the Peters et al. [20] depiction of a mapping study process as their starting point (Figure 1). Before embarking on the process itself, it is checked that no previous mapping studies exist in the intended area. The process begins from the definition of a research question, and then proceeds to the consideration of search strategies, search statements, and searches accordingly. Search strategies include data-base, manual, and snowball searches [21]. Inclusion and exclusion criteria are defined to select papers relevant to the review scope. Then data is extracted for instance by keywording the selected parts of the publications that passed inclusion criteria. Finally, the extracted data allows for mapping that typically employs visualization for informative overviews. The whole intended procedure is planned and documented for objectivity. Rigor is further increased by crosschecking procedures.

Due to a broad interest in depicting how a particular research topic has been studied, systematic mapping studies do not necessarily take into account the quality of the publications [21]. The mapping may occur in a topic-independent or topic-dependent fashion [21]: The former indicates categorization according to general attributes such as research type, and hence enables comparison between research fields. The latter indicates categorizations specific to the selected topic. This can occur inductively, e.g., by keywording selected publications and then categorizing the publications according to clustered keywords. On the other hand, categorization can be deductively based on existing coding schemes in the literature.

IV. THE TWO CASES OF STUDENT-MADE MAPPINGS

A. Local environment

The two student-made mapping studies originate in a computer science and software engineering-related study program located in Faculty of Information Technology. In these studies, a bachelor thesis and a master thesis, and respective seminar courses, have been the primary occasions for students to learn academic research. Thesis topics can be proposed by staff or by students. A final thesis topic is agreed on through supervision discussions between the student and the supervisor. A general research methods course was included in and removed from the curriculum during the past years according to available staff resources. Currently, a general research methods course is provided at the beginning of master studies to prepare students for subsequent master thesis work, and an introductory workshop on academic reading and writing is targeted towards second-year students to prepare them for the first written research-like outcome, bachelor thesis.

In the continuum of such program changes, Sari and Niko had gained experience in research during a bachelor seminar and writing individual bachelor thesis, in which educational goals are immersion in a particular topic through a rather short non-systematic literature review and learning basics of reporting such as referencing conventions. Additionally, during a master thesis seminar course, an overview of research methods was pointed to the students. In this seminar course, the focus was on research reporting and presenting research topics to peers. The two case examples of mapping studies are master theses that were supervised by the first author.

Research methods employed in computing are numerous, varying from technology-focused artefact building and evaluation to methods frequently used in humanities [11]. In the local faculty, this variety shows in several computer science-related programs that tend to relate to their own method traditions. This variety of the field resource-wise challenges in-depth introduction of particular methods to students, and provides the incentive to document and explore processes and experiences with particular research methods in student research. The argument is that example cases and reports on authentic experiences inform students and supervisors both locally and elsewhere. This argument is supported by the viewpoint raised in Section II, that potential gaps exist in how students are involved in research. No systematic application existed locally as to student-made secondary literature studies in the referred program. Few recent examples are master theses. The selection of a method for a master thesis is influenced by supervisors' knowledge and one-to-one discussions between the student and the supervisor.

B. Sari's mapping study

Sari studied the extent to which IP had been studied in computing education research. This target was proposed by the supervisor, after an interview study on the same topic was neglected as an uninteresting approach by Sari. The idea of the mapping was to review all annual conference papers

of SIGCSE community (ITiCSE, ICER, SIGCSE) to observe whether and how the topic of IP had been focused on. Previous secondary studies on the topic were not found.

The search strategy was manual inspection of the term intellectual property in pdf files of the referred yearly conferences available in the ACM digital library. This indicated a straightforward inclusion/exclusion criteria: the term intellectual property included and the availability in a pdf format. Any publication type of a conference was included. The collection was extensive; 6347 pdfs were inspected during the study. Searches into pdfs used first only the term 'intellectual' due to existing, multiple ways to refer to the topic of IP. This resulted in 559 papers, of which a combination of 'intellectual property' was found in 118 papers; the resultant sample received after inspecting the contexts in the documents where the term 'intellectual' was used. Sari documented the ways in which the topic of IP had been referred to in this sample, which can be seen as a mapping result as well. The terms used included intellectual property concern(s), intellectual property protection, intellectual property police(y)/(ies), etc. The whole variety of the terms is found in the first column of Table 10 in the original thesis [22].

Figure 2 presents yearly variations of the presence of the topic in SIGCSE annual conferences up to year 2015. Basically, the variations between conferences reflect the size of the conferences. Sari speculated that the peak toward the year 2000 may be due to increasing use of the internet. Figure 3 differentiates between the depths of how the topic of IP had been addressed in the sample. On the top, the category *Focused* (IV) comprises papers that could be judged to focus on the topic, and hence represents the most interesting category. The next category *Raised* (III) included papers with brief passages and considerations of IP in education. The category *Mentioned* (II) already indicated a quite superficial referencing to the topic, while *Term found* (I) refers to the minimum requirement of having the term 'intellectual property [xxx]' in the paper, for instance, in a references section.

The contribution of the thesis is the illustration of the extent of a topic within a particular research community. The results demarcate studies that focus on IP as an educational topic, which can serve as a useful cluster for further study and related work identification for a researcher considering a study on this area; the benefits of which are assigned to mapping studies [16]. Given that there were very few studies that actually focused on IP, the results indicate that this topic of professional practice may have remained marginal. Echoing the assumed benefits of a systematic mapping study, it can be plausible argued that a gap in the research literature was identified. To obtain information of the studies that specifically focused on IPR, the reader is advised to see Table 11 in the original thesis [22]. The whole list of included articles divided under three conference titles are found in Appendices A-C in the original thesis, with a category (I-IV) assigned to each individual paper according to the mapping categories in Figure 3.

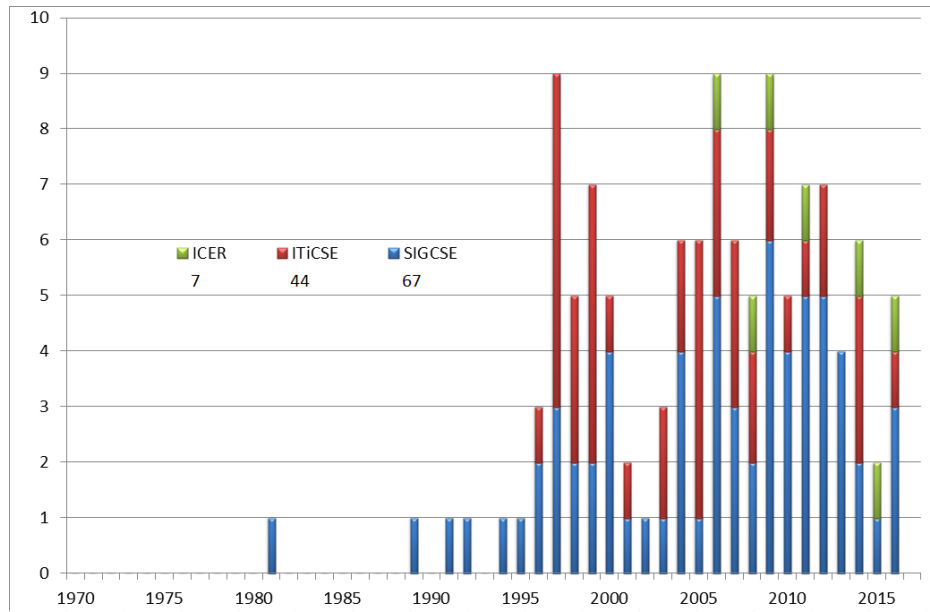


Fig. 2. Yearly variations for the presence of the term intellectual property

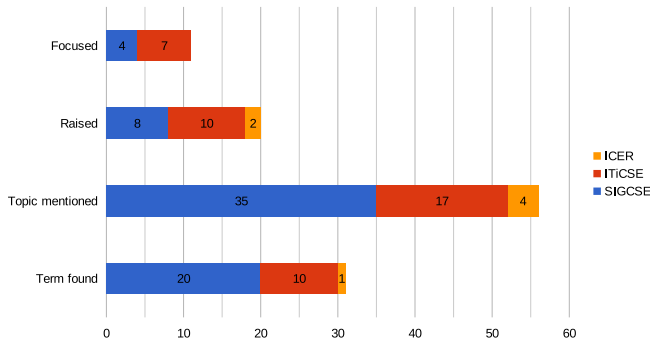


Fig. 3. The depth of topic in reviewed articles

C. Niko's mapping study

Niko studied how “creative coding” had emerged in the academic literature. The motivation was that this term was occasionally used in the literature while it was unclear where and how it has been a target of research. The topic was deemed relevant due to increasing inclusions of computing in schools, and it matched Niko's background, as he was creatively coding small projects at home. No previous secondary studies were found on this topic.

Niko's mapping questions concerned research types, research forums, tools (educational thematizations in tools sense), contexts, and age groups. The process followed the Peters et al. [20] guideline. Search statements taking into account synonyms such as creative programming were tested and defined for each digital library, and are documented in Table 2 in the original thesis [18]. The search strategy used hence was database searches. The initial searches yielded 884 papers, of which 91 were kept after applying inclusion and exclusion criteria. The important inclusion criteria were:

creative-coding was focused on (excluded if present as a side topic), available in Finnish or in English, concerned education, and published during 2012 or later. This sample of 91 papers were keyworded according to mapping questions, and then visualized using contemporary means such as bubble diagrams. The research type categorization was based on a simplified version of Wieringa's et al. [23] suggestion: we combined validation and evaluation categories into ‘empirical,’ because this differentiation was not considered necessary for achieving useful results with the education-related review scope.

Figure 4 presents reviewed papers according to their research type over the five-year period. This visualization shows that roughly half of the papers were empirical. Figure 5 is a yearly illustration of the research forums and publication types of the review sample. Finland's national publication ranking system was used to figure out publication types, as advised by Peters et al. [21]. The list of full names of the forums is available in Appendix B in the original thesis [18]. The figure shows that research on creative coding has spread out in different kinds of forums. Figure 6 illustrates tools-related thematizations of the reviewed papers, similarly over a five-year period. Table I relatedly presents the top ten list of these tools and technologies, showing that Scratch, Processing, and Arduino have been the most popular measures.

The contribution of Niko's thesis is the overviews of research on creative coding, an aspect highlighted as the benefit of a mapping study [16]. The main observation is that this research seem to have spread out in several disciplines, indicated by various disciplinary and multi-disciplinary forums. Moreover, variance also showed in how creative coding was found to concern target groups from kinder garden aged kids to the elderly people; see Figure 6 in the original thesis. These observations indicate that researchers planning contributions in

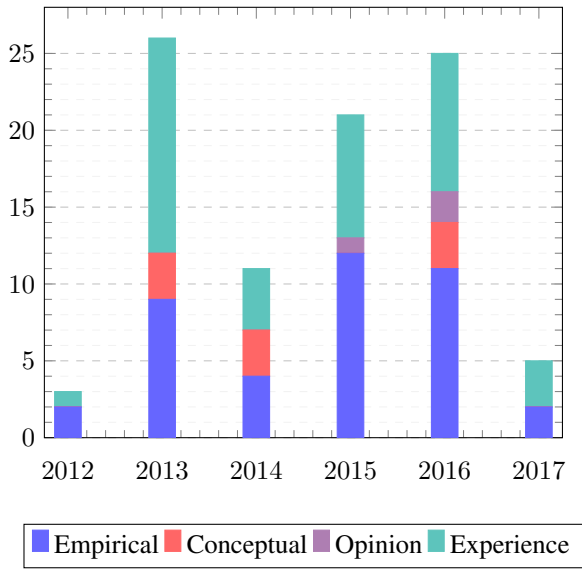


Fig. 4. Research types of included papers over a five-year period. The 2017 counts are initial; the searches were done 28th, Feb, 2017.

TABLE I
TOP 10 TOOLS OR TECHNOLOGIES IN THE REVIEW SAMPLE

Name	Count	%
Scratch	25	10.16%
Processing	16	6.5%
Arduino	12	4.88%
Kinect	6	2.44%
LEGO Mindstorms NXT	6	2.44%
Robotics	6	2.44%
EarSketch	4	1.63%
Raspberry Pi	4	1.63%
Unity	4	1.63%
Electronics	3	1.22%

this area should explore studies not only within their own discipline, but in any combinations and contexts where students, creativity, and building of technological artifacts unite. Practitioners again may receive ideas for course implementations by looking at the whole list of tools and technologies revealed by the Niko's mappings; see the top-ten listing in Table I, and the full listing in Appendix C in the original thesis [18].

V. EXPERIENCES

Resembling autoethnography, this section presents 'retroactive' and 'selective' exploration of past experiences [6]. Autoethnographers address personal experiences that are meaningful or even indicative of crises, and at the same time communicate about cultural experience [4], [6]. The related aspect here is that Niko's and Sari's voluntarily participation in preparing this article during their leisure time, after their graduation, was evidence of increased personal meaningful-

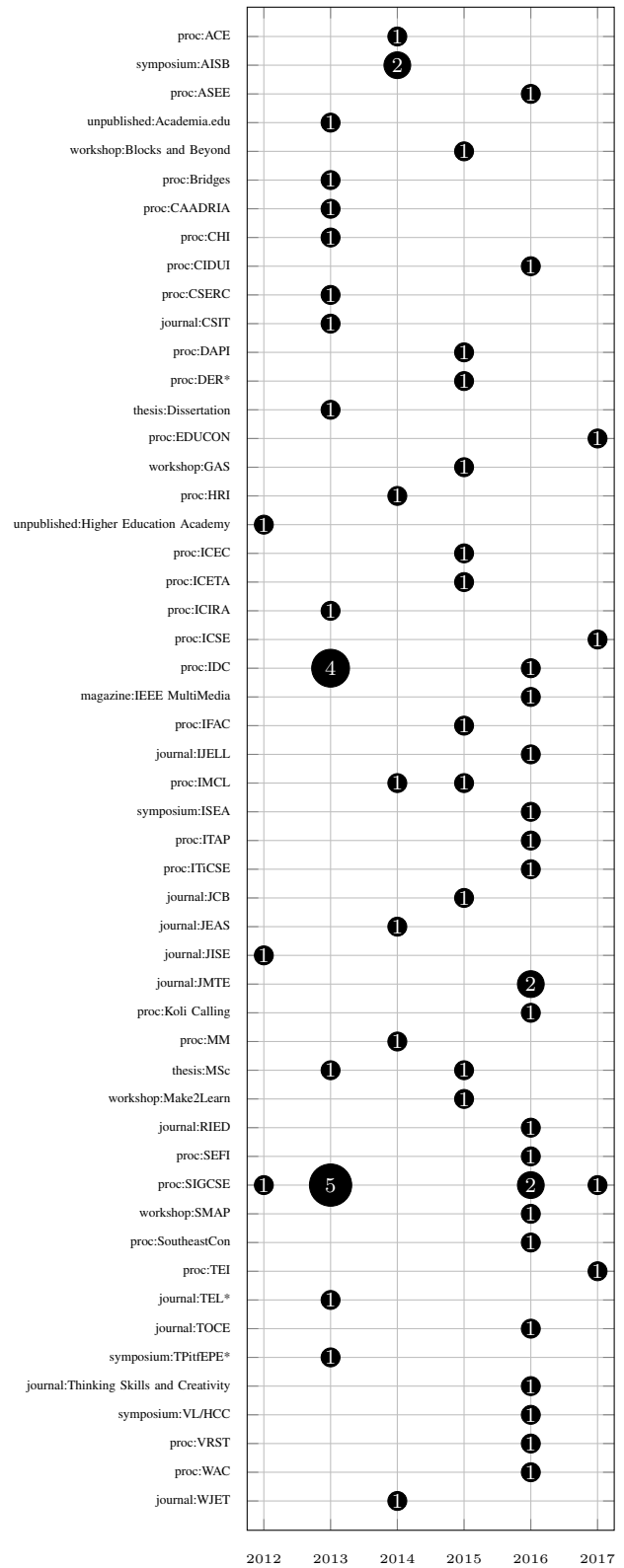


Fig. 5. Publication forums and types of the reviewed papers over a five-year period. The 2017 counts are initial; the searches were done 28th, Feb, 2017.

ness of research, and a consequence of a sufficiently authentic research project performed as master thesis work. Personal

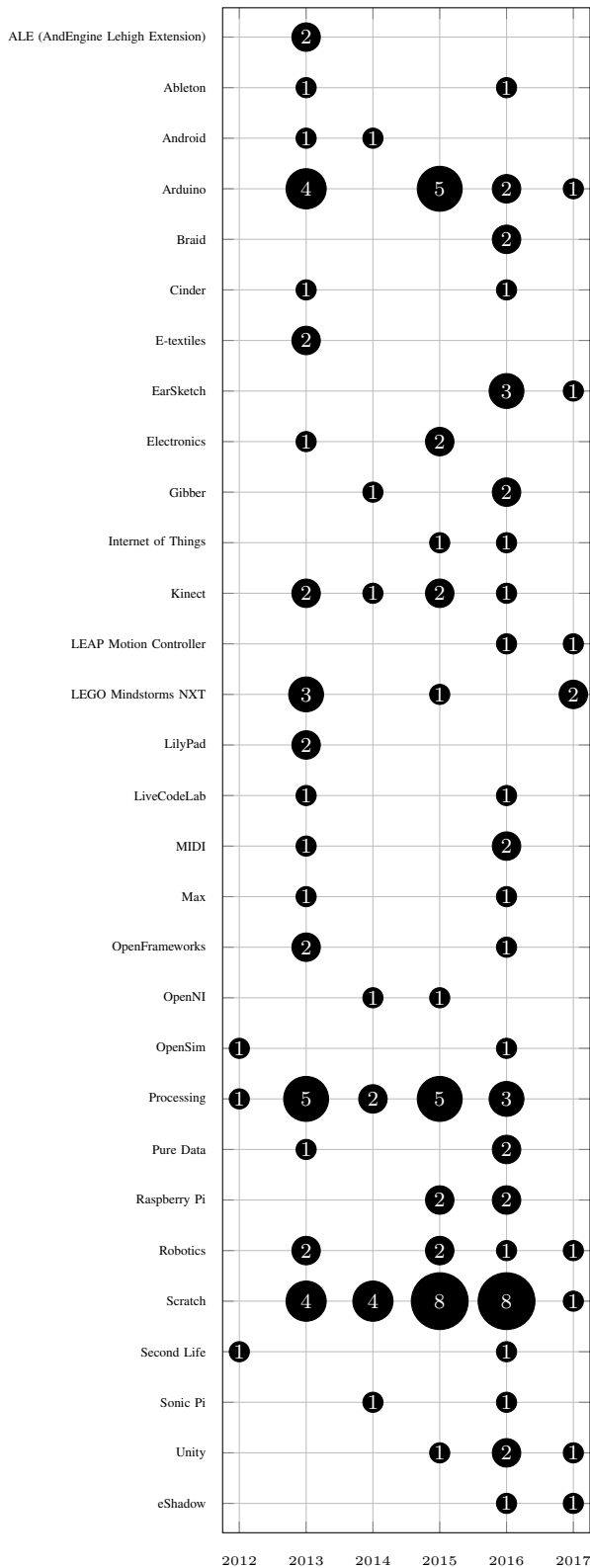


Fig. 6. Tools or technologies in the reviewed papers over a five-year period. The 2017 counts are initial; the searches were done 28th, Feb, 2017.

experiences below can inform and merge into the education-cultural narrative of how students are engaged in research. Sari prepared a written reflection report about selecting and applying systematic mapping. Niko and Ville had an audio recorded phone discussion with the same starting point. Ville reflected on his observations in the light of the literature. The narratives below comprise inductively emerged aspects that occupied the three authors with respect to the Sari's and Niko's mapping studies.

A. Sari's viewpoints

Sari noticed that

"clearly the mapping requires methodicalness in the performance of the research."

and continued that

"In fields like information technology, students can be more accustomed to this way of thinking. Something considered hard by others is not always the case. For this research topic, an interview research was first considered, but this felt more tiring to the student performing the research [refers to herself] than going through thousands of research papers. The student [Sari] was eager to work for the thesis at a different level. This becomes a challenge to the supervisor to face, to get to know the student so he or she [the student] can get the most out of researching on their own."

She relatedly underlined that the master thesis is a unique chance to practice research, try something out, and then, she argued, it is crucial to consider what methodological approach is chosen.

The above seems very interesting, pointing to the importance of considering matches between the students' professional identities and the nature of research method. Below, Sari considers the situation of choosing a systematic mapping study in another way:

If looked in wider scope, the mapping study is really what every new area researcher performs in some way in order to see what the best source should be. It gives the researcher control and a sense of thoroughly investigating all sources available. Systematic mapping study also keeps track of the source evaluation. In addition to the thesis information gathered, the student might even get familiar with the research community and their interest in topics in general. Even though the student [refers to herself] didn't have far-reaching goals as to a research career, it's always a pleasure to feel the involvement even for a while.

The above illustrates internalization about the purpose of the research method used, and how mapping study enables to receive a broad view of how a particular topic area is addressed. This was further clarified when Sari continued to explained her preference to a larger-scope study over something else:

For the student to find out larger scope of information can be a valuable goal, if no special interest is already in mind. [...yet in other words:] Approaching the big picture could be more rewarding [compared to other methods] when there's no personal interest in the research topic originally. The work invested in the master's thesis should in all cases give the student a feel of achievement. A student who learns a lot about the research method and the topic of the study will feel twice the joy of finishing the work.

The point stressed here is that the mapping study suited well the rather open starting point where the student did not initially demonstrate personal research interests. The quotations above also emphasize an experience of the educative feature of performing a secondary literature study.

Sari also referred to the fact that studying research methods had occurred only by getting an overview of the methods in a thesis seminar course. This condition illustrates the lack of holistic and gradual exposure to research locally; a call for curriculum wide, in place of selective, exposure was made in the literature (Section II). She argued from a student perspective that there had been too little guidance on how to apply various methods in practice, and noted that:

Without the guidance from the supervisor, seldom used methods may remain a myth to the students.

Conforming to these experiences, Sari considered that the challenge with the systematic mapping study was the scarcity of useful examples in the literature.

B. Niko's viewpoints

For Niko, perceived workload was a major obstacle in the beginning:

Niko: At first the impression was that it [the mapping study] is terribly toilsome. I had a long thought that whether I dare to embark on this. But then I thought I can automate [manage] the analytic process by a database. That resolved it in my case. You see that there's work to be done but you may get the results easily [refers to tools].

Ville: You mean an experience of compensation for the perceived workload by getting proper tools ready for the work?

Niko: Yes. If I had had to do this all manually [refers to management of review], I might have not started this [...] all the work was basically reviewing the search results of articles [indicates that the results could then be easily produced from the database]

He further describes tools preparation:

It was that I used that hour for getting the search results with Javascript. That was crucial as the search results would have changed, as they did when I did re-searches.

Javascript was used to extract initial search results and to save them in a csv format, meaning that the search results could be returned to without any concern of losing or continuously altering search results. Moreover, from the very beginning, Niko built a database to manage the inclusion and exclusion decisions, the keywording process, and the construction of data for visualizations.

Niko contemplated that his work greatly benefited from Peters' et al [20] guidelines, and he considered them to be clear and useful. Discussion then turned to Niko's earlier exposure to research methods, with the observation that this had been minimal. For this reason, Niko acknowledged some confusion until finding the Peters et al. guideline.

Then, the perceptions of applying a systematic mapping study approach were elaborated on:

Niko: Yes, I got meaningful results, and it [the method approach] was hence a good choice. It was nice to see how the area had been studied, you clearly saw something there. [...] It was a struggle first, and then it becomes concrete [...]

This refers to rewarding experiences, and a positive experience of receiving concrete overviews of the research topic, as is proposed in the literature [16]. Similar to Sari, Niko hence reported on an educative personal experience.

Niko recognized himself as a practitioner, and was happy to be able to capitalize on that property:

Niko: These kinds of studies and analyses are meaningful. Otherwise, reporting and such academic stuff had not been my thing, which you actually see in my thesis.

Ville: [...] You mean you do not have that academic orientation [...] you mean you can achieve good things by concise reporting.

Niko: Yes.

Then, we discussed the meaningfulness of the topic.

Ville: What about the topic itself, it matched your hobby?

Niko: Yes, but we limited it [the mapping] to education studies. It would have been more interesting to cover the whole topic, how it has been studied overall.

Ville: Do you think the match with your hobby was important.

Niko: Indeed, it is so. That it is your topic. Well, you might notice to get interesting results [with a given topic]. But otherwise I think I would not embark on it if someone gave me any topic.

Finally, the personally interesting topic was noticed to increase interest in the results revealed:

Niko: it is enough that you have at least some personal interest. Then the results are interesting to you.

Taken together, building tools for the mapping process mitigated the early stress with perceived workload, facilitated the research process, and matched Niko's practitioner identity. Delimiting the review scope to educational studies was experienced as a compromise, although attempting to make workload reasonable.

C. Ville's (supervisor) viewpoints

I was surprised of how much Sari's and Niko's narratives emphasized the match between their personal preferences and the nature of the research method, although we had changed Sari's method from an interview study to that of systematic mapping. This increased awareness has consequently helped me recognize hesitation with a particular method in other student research projects demonstrating slow starts. In faculty discussions, supervisors and students often emphasize personal relevance of thesis topics in order to engage students with research, as is done in the literature [19]. What I learned by this 'retroactive' reflective collaboration with Sari and Niko, is that the ownership should include explicit considerations of the match between nature of work with particular method and student preferences (background). Personally interesting research target—and the proposal for others—is the influential factors in student background.

Discussions during the thesis projects comprised issues reflected on in the professional literature on mapping studies. For instance, in supervisor-student discussions, we articulated inclusion and exclusion criteria in an overlapping manner, as negotiations. However, a similar overlapping use is found in the example included by Peters et al. [21]. In personal correspondence [13], an expert in systematic secondary studies [14], articulated a helpful guideline: "inclusion" refers to the interest set of the intended mapping, and "exclusion" indicates constraints, that is, what is extracted from the interest set for particular reasons. I am referring to the experience that one should not just assume that methodological language is "transparently meaningful" [17] to students. In this case, the language was unclear to me as well.

Another concern was rigor related to crosschecking of decisions during the mapping processes. Niko pointed out unclear cases of research types before regular supervision meetings. I reviewed these cases, and we together articulated inclusion/exclusion criteria in a think aloud manner on these cases during the supervision meetings. These articulations were written down for subsequent use. A think aloud protocol has been proposed to align understandings regarding inclusion/exclusion criteria [1]. The on-request think-aloud procedure seemed to improve the process, and may be recommend as a minimal cross-checking procedure for individually performed student mapping studies. On the other hand, I had no resources reserved for a thorough independent crosschecking,

and learned that the supervisor involvement and relatedly the dissemination of study results should be discussed early on.

I was continuously worried about Sari's and Niko's workload: Niko noted that delimiting his mapping to educational studies felt like a compromise, while Sari had a temptation to continue the mapping study by a focused review on the most interesting cluster of articles revealed by the mapping. The scopes were retained, and I argue that with laborious monotonic literature review emotional scaffolding is needed regularly (e.g., biweekly) regardless of the amount of progress made. The use of single search strategies may also be seen as a shortcut, but such approach is also demonstrated in professional research, as foregrounded in [21].

VI. IMPLICATION FOR PRACTICE AND RESEARCH

This paper reviewed two student-made systematic mapping studies to disseminate their results to wider audiences, and to reflect on the use of a systematic mapping study as a methodological approach to student research. The contributions of these research projects were: Sari's work demarcated a cluster of educational studies focusing on intellectual property for the benefit of researchers, while showing a potential gap in education research concerning this topic. Niko's work illustrated how studies on 'creative coding' had spread out in greatly different forums, while informing practitioners of the use of creative coding in teaching. These aspects conform to the acknowledged benefits of mapping studies; see [16], [21].

Regarding the framework of student research, it was learned that the selection of a research method may play an important role in engaging students in research. The literature emphasizes the students' perception of the ownership of their research with respect to the relevance of the research topics [19]. In the present study, a student perception was that when there was not any personally interesting research topic available as a starting point, the systematic mapping study approach turned out to be a valuable option, leading to and educative experience, engagement, and finally to rewarding experiences. The other student perceptions emphasized that it was important that the nature of method, mapping work, matched with the student's background.

The implication to student research supervision is that sufficient time should be reserved for discussing methodological options in relation to the students' preferences. How Sari and Niko voiced this issue indicates that supervisors should learn about identities of their students. Both student narratives indicated that mapping studies might match well the background of computing students who are used to the kind of an "engineering" nature in systematically managing and analyzing data. Here, Niko amplified that his self-developed tools for mapping were the crucial enabling factor. Niko generally recognized himself as a practitioner, which hints that identity should be considered not only in a disciplinary context but personal context as well. A topic for future research then is the relation between student preferences with respect to the research method and how students can be engaged with research.

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