International Journal for Academic Development

ISSN: 1360-144X (Print) 1470-1324 (Online) Journal homepage: https://www.tandfonline.com/loi/rija20

Improving curriculum alignment and achieving learning goals by making the curriculum visible

Leoniek Wijngaards-de Meij & Sigrid Merx

To cite this article: Leoniek Wijngaards-de Meij & Sigrid Merx (2018) Improving curriculum alignment and achieving learning goals by making the curriculum visible, International Journal for Academic Development, 23:3, 219-231, DOI: 10.1080/1360144X.2018.1462187

To link to this article: https://doi.org/10.1080/1360144X.2018.1462187

Published online: 26 Apr 2018.

INTERNATIONAL JOURNAL FOR ACADEMIC DEVELOPMENT
2018, VOL. 23, NO. 3, 219–231
https://doi.org/10.1080/1360144X.2018.1462187

Routledge
Taylor & Francis Group

Improving curriculum alignment and achieving learning goals by making the curriculum visible

Leoniek Wijngaards-de Meij[a] and Sigrid Merx[b]

[a]Faculty of Social and Behavioral Sciences, Department of Methodology and Statistics, Utrecht University, Utrecht, the Netherlands; [b]Faculty of Humanities, Department of Media and Culture, Utrecht University, Utrecht, the Netherlands

ABSTRACT

Curriculum alignment is crucial in realizing learning objectives, but in higher education the alignment is often challenged by practical problems. The adverse effect of misalignment is further amplified by the lack of student awareness of their position within the curriculum. We argue for the importance of the visibility of learning trajectories across the curriculum and discuss the implementation of a digital curriculum mapping tool. We use four case studies to discuss how the tool was employed along four themes: curriculum development, visibility, assessment, and learning enhancement. This article discusses the pitfalls and best practices in the process of introducing a new method of enhancing curriculum visibility.

ARTICLE HISTORY
Received 17 March 2016
Accepted 12 March 2018

KEYWORDS
Curriculum; curriculum alignment; visibility; innovation

Introduction

Many academic developers and teachers in higher education will recognize the following situation. Students who claim, even swear, hands on their hearts, that they have never practiced skill A or method B before, or that they have never heard of theory Y or author Z, while the teacher is absolutely convinced that surely this must have come up at some point in previous modules, courses, or subjects. Highly frustrating considering the fact that in a curriculum one wants to build upon already existing knowledge and skills. What went wrong? Do the students suffer from poor memory? Is the teacher misinformed or unaware of what was covered earlier in the program? Might there be a lack of alignment in the curriculum?

In this article, we discuss an innovative education project that addressed the two related problems encountered by teaching staff and academic developers at Utrecht University in the Netherlands, namely on the one hand the lack of student awareness of their academic development and their position within the curriculum (why am I learning this now?) and on the other, the difficulty of creating and ensuring curriculum alignment.

Undergraduate curricula at Utrecht University, like most curricula in the Netherlands, primarily consist of mandatory courses and pre-determined tracks. Obviously, this has an influence on how curriculum development and the development of learning trajectories can

CONTACT Leoniek Wijngaards-de Meij l.wijngaards@uu.nl

be discussed. However, as in other international contexts, we are witnessing an increasing freedom of choice for students when it comes to composing their programs. In these cases, the question of how to create and organize content in such a way to guarantee students achieving learning goals is becoming even more relevant and challenging.

In this article, we introduce and discuss the process and evaluation of the implementation of an interactive digital curriculum mapping tool that has been designed at Utrecht University. The tool was developed to assist academic developers and supervisors in practically negotiating the aforementioned problems and to facilitate processes of improving curriculum alignment and visibility of learning trajectories for teachers and students. The online mapping tool offers a smart but comprehensive overview of a learning trajectory in the curriculum. We conceptualize a learning trajectory as a coherent composition of teaching and learning, offered within different courses that together build towards achieving learning objectives. By using the tool, students, teachers, and curriculum assessors can easily access an up-to-date overview of how and when skills and knowledge are taught throughout the program.

The project was carried out to conform to the plan-act-reflect cycle characteristic of action research methodology: the problem was analyzed and translated into actionable steps to solve the problem, which were then executed and reflected upon. If in these reflections problems were identified (either new or already existing), the cycle was repeated (Carr & Kemmis, 2003). For the evaluation of the actions within different departments, we gathered either qualitative data through focus groups consisting of students, teachers or coordinators, or quantitative data through student surveys.

Three central concepts are strongly related to the problems that fueled the development of the tool: the importance of visibility of the learning trajectory in the curriculum, the importance of curriculum alignment, and the relevance of curriculum mapping tools. Next, we introduce our case studies and discuss how three different undergraduate programs and one graduate program at Utrecht University have implemented the tool in their own respective educational contexts with different aims in mind. The case studies are structured along four practical themes: curriculum development, curriculum alignment, curriculum assessment, and learning experience enhancement. In each section, results of the evaluations are discussed including pitfalls and good practices, as well as alterations based on reflections during the action research cycle (Carr & Kemmis, 2003). Next, we give recommendations to counteract the challenges we identified in the process. In the conclusion, we reflect on the most important gains to be achieved by implementing a visible learning trajectory, but also consider which effects we could not (yet) establish and need further exploration.

The visibility of the learning trajectory

The idea for the tool came into being when, in 2013, teachers in the Psychology department complained about their students' apparent lack of research skills when starting to write their undergraduate thesis. Asking their students why they did not know how to do research, they replied they had never been taught how to do this or simply did not remember.

To gain a better understanding of the problem, the Methodology and Statistics Department carried out small-scale qualitative field research and talked with teachers, students, and tutors. This showed that, although many of the research skills proved to have been taught and practiced in different courses, the students had not perceived this as such.

They were not aware how different elements of courses functioned as building blocks in the development of their research skills and knowledge. Such a lack of awareness of one's knowledge and skills is problematic, since it prevents students from adequately reflecting on their own learning process.

Reflection plays an important role in increasing learning outcomes, especially with respect to skills that overarch the curriculum (Ausubel, 1960). Making learning trajectories explicit and visible for students, or what Diamond terms 'transparent articulation' (2008), can help promote reflection and potentially enhance the quality of their learning processes. O'Neill, Donnelly, and Fitzmaurice (2014) also state the importance of carefully considering communication about curriculum sequencing. When teaching an academic skill dispersed over the curriculum, it is important to facilitate the learning processes of students by stimulating them to recall prior knowledge, and relate it to new knowledge (Merrill, 2002). One of the assumptions of the project was that making a learning trajectory visible for students helps them to better activate prior knowledge and organize new knowledge into a meaningful context (Merrill, 2002). However, the value of making learning trajectories visible depends on how well-structured and well-thought through this learning trajectory is in the first place.

The importance of curriculum alignment

Curriculum alignment can be discussed on different levels. Fraser and Bosanquet (2006) distinguish four different categories. In the first category, curriculum refers to the content and structure of a single unit. The second category focuses on content and structure at program level. Both categories entail a product-based understanding of curriculum. In the third category, curriculum is understood from the point of view of the student's learning experience (e.g. Fink, 2003). The fourth category approaches curriculum as the co-construction of knowledge between student and teacher. These two latter categories are characterized by a process-based approach. In our project, we situated the question of curriculum alignment in the dynamics between program structure and student's learning.

According to Biggs and Tang (2007), curriculum alignment at program level, that is, the constructive coherence between teaching, learning, and assessment, is crucial for the quality of teaching. In order for learning objectives to become actual learning outcomes, and therefore to optimize students' learning, it is important to make sure every activity helps to realize the learning objectives. They call this 'constructive alignment'. Whereas, within the context of a single course or module, alignment can be realized fairly easily, creating alignment at the program level proves to be more difficult.

When investigating how research skills were taught throughout our Psychology undergraduate curriculum it appeared that, due to a lack of communication between supervisors and teachers of different courses, a number of aspects of doing research had been taught multiple times in different courses, and other aspects had not been addressed at all. This problem is not specific to this particular program. Allen (2004) argues that ensuring alignment in curricula in higher education often proves difficult due to a lack of communication between teachers and constant changes in programs, modules, and staff over time. Teachers who are part of cross-curricular learning trajectories are often not fully aware of other parts that encompass the learning trajectory.

Our online curriculum mapping tool has been designed to help teachers in developing a better understanding of the curriculum and position their own course or module more carefully in relation to other courses and modules within the context of a particular learning trajectory. Moreover, the tool aims to assist curriculum developers in detecting inconsistencies and misalignments in their programs.

The relevance of curriculum mapping tools

As we have seen, two problems played a role in the case of the undergraduate Psychology program: the lack of coherence and alignment in the curriculum with respect to research skills and the lack of visibility and coherence of the learning trajectory. Curriculum maps can address both problems as they document and visually display the relationship between different components of the curriculum (Healy, 2011). They provide data that helps students, teachers, and administrators 'to make evidence-informed decisions based on the strengths, gaps, patterns, linkages between courses, and other phases of the curriculum' (Dyjur & Lock, 2016). Curriculum maps come in different shapes and forms (Dyjur & Lock, 2016), but one way or another they all allow for collecting and recording curriculum-related data that identifies information such as content and skills taught, and instructions and assessments used throughout the curriculum. In short, curriculum mapping is all about making the curriculum transparent for all stakeholders involved (Harden, 2001).

Curriculum mapping tools are increasingly used in different countries to review and improve the coherence in the curriculum and to provide an overview for quality assurance committees and accreditation bodies (Dyjur & Lock, 2016). Often mapping tools are used to report data on student outcomes on generic attributes (Bath, Smith, Stein, & Swann, 2004; Fraser & Thomas, 2013; Spencer, Riddle, & Knewstubb, 2012; Sumsion & Goodfellow, 2004). Such approaches towards curriculum mapping reveal an increasingly dominant focus on outcome-based education (see also Wang, 2015), where quality assurance is based on being able to demonstrate that expected learning outcomes have been realized.

In other cases, mapping tools have been used to stimulate curriculum alignment by indicating flaws and shortcomings. Curriculum developers involved in mapping report the importance of the increase of collegial cooperation and discussion (Sumsion & Goodfellow, 2004; Uchiyama & Radin, 2009). In an academic world where teaching is often a lonely endeavor, enhancing cooperative approaches towards reviewing and improving the curriculum is a potentially positive aspect of curriculum mapping (Uchiyama & Radin, 2009).

As we have seen, different mapping tools have different foci. They are either used as a tool for planning, communication, or curriculum analysis (Dyjur & Lock, 2016). At Utrecht University, we aimed for a mapping tool that was able to integrate those different functions and could facilitate different processes.

Implementation and evaluation

Our online mapping tool has been designed in such a way to assist both academic developers and teachers in (re)developing, (re)structuring and (re)aligning their curriculum, and ultimately to help students to become aware of their learning trajectory and re-activate their prior knowledge. Furthermore, the tool was adopted by several programs to show the learning trajectories within the curriculum to assessment committees. Our aim was to create

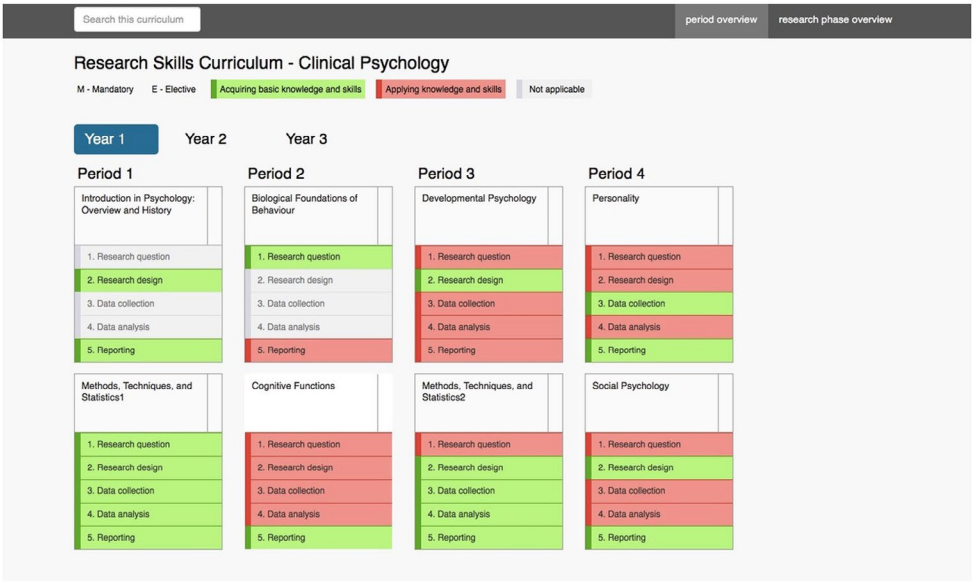

Figure 1. View of learning trajectory Research Skills Psychology in online tool.

a curriculum map that is easily accessible online, visually attractive, user-friendly and able to cater simultaneously to the different needs from different stakeholders.

Our tool offers students, teachers, academic developers, and quality committees a clear overview of the curriculum. This overview can be displayed both in a chronological view (see Figure 1) as well as a component view (e.g. a specific skill), allowing for different kinds of analysis and understanding of the curriculum. At the same time, the tool provides detailed information not only about where and when, but in particular also *how* different components are taught in different courses in the program (see Figure 2). This information can, amongst other possibilities, entail the detailed description of a particular component, a visualization of how and when the component is being assessed, or links to actual learning materials, such as relevant literature, presentations, lectures, and instructions related to that component. In this latter respect, our tool combines characteristics of a mapping tool and an electronic learning environment (ELO). Finally, a search function allows different users to filter and access information according to their individual needs.

Having discussed the central concepts of the importance of curriculum alignment, visibility, and curriculum tools, we now discuss how the online mapping tool has been implemented in four pilot projects, involving three different undergraduate programs (Psychology, Media and Culture, Veterinary Studies) and one graduate program (Pharmaceutical Sciences). During a two-year period these programs, supported by the Utrecht University Centre for Teaching and Learning (COLUU), worked on constructing different types of cross-curricular learning trajectories, making them visible with the online mapping tool, and implementing the use of the online tool within the departments. Through our action research approach we evaluated the steps along the way and used the output of the evaluation

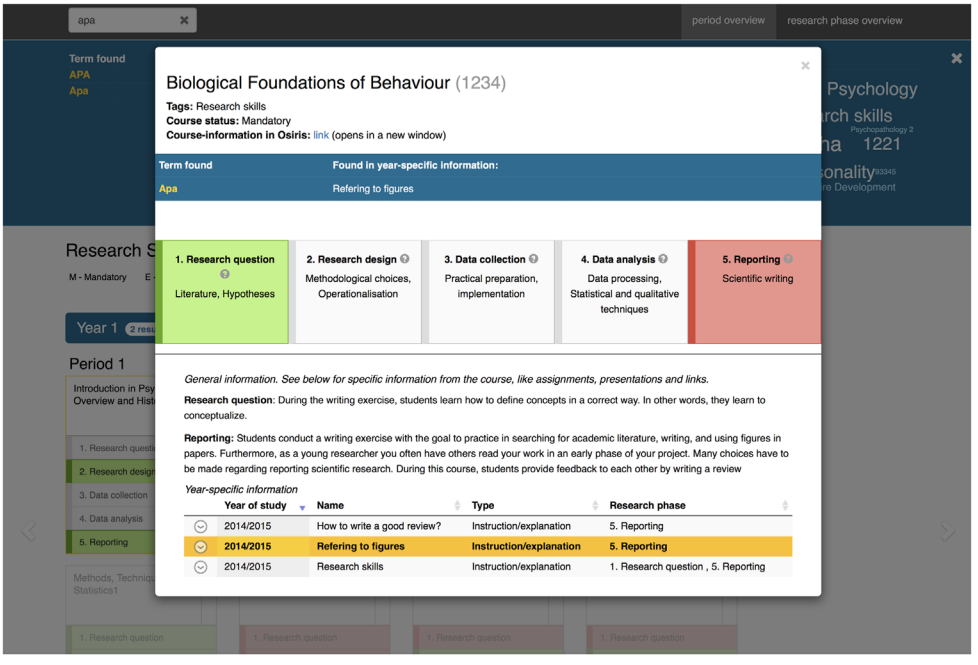

Figure 2. View of content Course within curriculum in online tool.

to adjust and improve the next steps (Carr & Kemmis, 2003). In the case studies, we discuss best practices and pitfalls.

Curriculum development

The undergraduate program Media and Culture started to use the tool when it had been reorganizing the undergraduate program due to an overarching restructuring of the humanities department. The program changed from offering single courses, coordinated by individual instructors in the first two years of the undergraduate program, to providing clusters of four courses around a central theme or research topic, making teams of instructors responsible for the total cluster. The reorganization was used as a starting point by the coordinator of the undergraduate program to create a new learning trajectory for research skills within and across these new clusters, as the obtained level of research skills had been identified as a weak spot in the curriculum during the last accreditation process.

When a new curriculum is put together or when a major revision is done in an undergraduate program, several learning trajectories need to be incorporated in the courses the curriculum is composed of. Specifically, for skills of which different parts are taught in separate courses, it is essential to discuss the learning trajectory that leads to the end goals. In developing the learning trajectory, the contribution of the different courses to the trajectory can be visualized in the online curriculum mapping tool, and by doing that a solid basis for discussion and further development is created. Media and Culture decided to use the tool to map and create an overview of how research skills were being taught and assessed in different courses within the new clusters and across the curriculum.

After using the tool, in the evaluation with the teachers involved in the new clusters, the following positive points were identified: first, the tool had functioned as a visually attractive and meaningful springboard for a series of discussions with the teaching staff on how to define a learning trajectory for research skills within the new curriculum structure. Second, having to fill the tool with information with respect to one's own courses had triggered reflection on those courses and their position in the curriculum. Finally, the discussions about the changes to be made in the curriculum were centered around and fueled by the online curriculum mapping tool.

Although the tool did function as a facilitator for the discussion about a research skill trajectory, the outcomes of this discussion were never formalized in the official description of such a learning trajectory. As a result, the tool was never implemented in the program's quality assurance system to help evaluate curriculum alignment. Nor was it used to make the learning trajectory visible for students. In the evaluation, the main reasons for this were identified as having a particular departmental culture that highly appreciates the autonomy of the teacher and perceives of formalizing procedures in education as top-down meddling, and being an understaffed department with high workloads, which brings with it a general fear of extra work. This fear could not be dispelled by informing the teachers about the possible benefits for students and teachers.

Curriculum alignment

In contrast to the Media and Culture program, the three other programs used the tool to create an up-to-date overview of pre-existing learning trajectories. When a learning trajectory is already developed and present in a curriculum, the alignment can be subject to change because of developments in the content of single courses, but also because of changes in staff.

Communicating these changes and discussing possible consequences for the learning trajectory has proven to be difficult. If these changes are discussed, for example during an annual meeting, it is hard to keep everyone updated. When a static document such as Word or Excel is used, the newest version needs to be sent around to all stakeholders constantly. By using the online curriculum mapping tool, the learning trajectory was made visible and accessible for all teachers involved in the curriculum. Individual teachers, teams of instructors and coordinators could now check at any point during the year what research skills (Psychology), professional skills (Veterinary Studies) and analytical skills (Pharmaceutical Sciences) their students had been taught when, where and how.

In the evaluation of the implementation of the online tool some key elements for success were identified by staff. First of all, because curricula in general and courses in particular can change, due to changes in staff and/or policy, alignment needs to be checked at regular intervals with all staff involved. This is difficult to realize because of the hustle and bustle of everyday teaching. Therefore, a clear schedule of moments to discuss alignment is crucial. That is why, for example the undergraduate program Psychology decided to discuss the learning trajectory every year in an annual meeting before the start of the academic year. This moment is used to discuss and exchange alterations in the courses that might influence the coherence and alignment of the trajectory.

During one of the evaluation sessions, an important bottleneck was identified. Although the tool was designed to make updating content as easy as possible for teachers, in reality teachers often seemed too busy or not engaged enough to bring themselves to update the

content. To keep the information in the tool up-to-date and functional, the information needs to be checked and if necessary adjusted at least once every year. In response to this observation a number of guidelines were drafted. The maintenance of the tool not only requires the organizational implementation of a structural PDCA-cycle (plan, do, check, adjust) with respect to the tool, but also clear agreement on the division of responsibilities in this process of updating. Concerning the latter, we concluded, supported by observations from the case studies, that it is essential to assign a coordinator to each learning trajectory who is also responsible for coordinating the maintenance of the tool. Consequently, coordinators were appointed for Pharmaceutical Sciences and Veterinary Studies.

Enhancing students learning

One of the main goals of the introduction of the online curriculum mapping tool was to enhance students' learning by improving awareness of their position within the curriculum through making visible the stepwise development of particular skills or knowledge throughout the curriculum. However, making learning trajectories visible in itself is not enough to improve this awareness; the student has to be actively engaged in reflecting on the learning trajectory in relation to their own learning process. In order for this to happen, it is necessary that the student actively engages with the tool itself as well.

In an early stage of the project a small-scale qualitative survey among psychology students (n = 18) showed that students, although positive about how the tool provided an overview and increased a sense of coherence with respect to their academic development, were also quite skeptical about using the tool on their own. As one of the students put it: 'If I don't have to do anything with it, I won't use it.' To address this problem, different programs developed different strategies during the project.

The Psychology program decided to incorporate the use of the tool in the student tutoring system in the first year of the program. Within the first two months of the first year, tutors introduce their students to the learning trajectory for research skills displayed within the tool. Moreover, the online overview of the learning trajectory is demonstrated and briefly discussed in each first-year course at least once in order to help students remember where they are in their learning process and to confirm the position of that particular course within the learning trajectory.

As the evaluation with both the teachers and students about the use of the tool in the Psychology curriculum showed, it was not easy to keep all the tutors, teachers and students involved over the years. Specifically, students' active engagement with the tool required specified actions to integrate the use of the tool in the standard processes.

Another strategy to actively engage students with learning trajectories via the tool was used in Veterinary Studies, where a learning trajectory for professional skills was presented in the online curriculum mapping tool. For this trajectory, professional skills were divided into five components and each component was aligned with a series of tests and assignments students had to take as part of the learning trajectory and in the context of a particular course. Veterinary Studies chose to make these assignments available only online and integrated them into the tool. By forcing the student to use the tool to access the assignments, the student was repeatedly reminded of both the fact that there is a learning trajectory for professional development of veterinary skills overarching the curriculum, and of the place each assignment has within this trajectory.

In focus groups, Veterinary Studies students were positive about the use of the tool in that they found it helpful to know they were following an aligned trajectory on professional skills. However, students also indicated that it was not practical that the tool was yet another digital learning environment they had to work with. In response to this observation the tool was integrated into the standard digital learning environment of the university, leading to its incorporation in the actual curriculum and its teaching.

Finally, Pharmaceutical Sciences started its pilot with the tool from the observation that graduate school students often seem to have forgotten knowledge and skills acquired during their undergraduate study. Therefore, the learning trajectory of pharmaceutical analysis was made visible in the online curriculum mapping tool to provide an overview of all analytical techniques and methods of the undergraduate program. The main purpose was to allow graduate students to see what techniques had been taught previously, and to allow them to refresh their memory. The use of the online curriculum mapping tool was integrated in a graduate school course, where the course coordinator had his students make an assignment in which they had to use the online curriculum mapping tool to re-activate their knowledge of analytical techniques and to identify any possible gap in their knowledge and skills by themselves.

A small-scale qualitative student survey (n = 15) showed that the tool and the related assignment were especially appreciated by graduate students who had taken their undergraduate studies at other departments or universities. Perceived as merely a repetition by students at the home university, the assignment proved to help other, mostly international, students to become aware of what knowledge and skills were expected in the program, and to relate this to their own previously acquired knowledge and skills, while at the same time providing them with relevant teaching materials to actively fill any gaps. Because of the Bachelor's-Master's system in place at many educational systems around the world, and given the fact that due to globalization more and more students decide do their Master's degree abroad, the tool might therefore be of particular value to support international students in their new educational context.

Curriculum assessment

Although the focus of this project was primarily to enhance the visibility of learning trajectories for students and teachers, focus group evaluation indicated further potential for the tool, namely in demonstrating program quality to external quality committees and accrediting bodies. In the Netherlands, every six years the quality of teaching at a university is assessed and accredited by an external quality committee. Mapping tools in general, as we have seen, offer evidence of program quality and can be used for accreditation purposes (Dyjur & Lock, 2016).

The tool not only clearly visualizes the different learning trajectories within the curriculum for the committee, but also provides easy access to the content related to that trajectory, allowing schools to highlight which skills/knowledge they deem important in their program. Moreover, the mere presence of an up-to-date tool, testifies to alignment within the program.

Challenges and recommendations

Looking back at the implementation of the mapping tool for curriculum development, curriculum alignment, curriculum assessment, and enhancing student's learning, we acknowledge different challenges and would like to share some recommendations that are relevant for teams across borders.

New tools are not always immediately embraced by those who are expected to work with it. In universities, innovations and transformations are often met with distrust or even open resistance in particular when they are organized top-down (see in Fraser & Thomas, 2013; Anderson, 2008; Neame, 2013). This resistance can prove to be a real challenge for implementing a curriculum mapping tool. Although the project started as a bottom-up initiative and in response to problems experienced on the ground, some staff members felt the tool had been forced on them.

Teaching staff concerns in all four case studies had to do with fear of extra work involved in populating and updating the content. Taking into account the already heavy workload of the teaching staff and the resistance to engage in administrative work, in three of the four case studies it was therefore decided to appoint a student assistant to collect all necessary data from existing course descriptions and course manuals, crosschecking the findings with the respective instructors. In the case of the undergraduate program of Media and Culture this crosschecking was organized in the form of a short interview between assistant and instructor. Staff reported that checking the collected data and discussing them with the assistant already had been very helpful for them to critically (re)assess on course level how they were teaching research skills. Overall, the presence of a student assistant was highly appreciated in all three programs.

The concerns of educational managers were of a different nature and had to do with the fact that our tool was competing with other systems that are in use in our university, in particular assessment plans that relate assignments to end terms. Although very different in style, intent, and functionalities, educational managers are skeptical about yet another system and in particular hesitant to put any extra workload on their staff. We have experienced that it is crucial to take time to show staff the benefits of the tool. Therefore, meetings with and for the Heads of Education were organized, as well as a symposium for academic developers and program coordinators. Furthermore, a website was created to provide interested people with the necessary information to get started. These different strategies of dissemination seem to have been successful, given the fact that we are receiving a growing number of inquiries from both within and outside our university regarding the mapping tool.

One of the biggest challenges of the project in our view was the implementation of the tool not only as a curriculum mapping or design tool, but as an educational tool that is beneficial for students. Although students in general were appreciative of the visual lay-out of the tool, the accessibility and overview it provided, they also claimed that they would only use the online curriculum mapping tool when it was relevant for an assignment or test. In three of the four case studies students were actively introduced to the tool, in classes (Psychology), in tutor meetings (Psychology and Veterinary Studies) and through active assignments (Veterinary Studies and Pharmaceutical Sciences) respectively. We have experienced that the more integrated within actual coursework, the more actively students will use the tool.

To maintain the mapping tool, we recommend appointing a coordinator who is responsible for communication between the teachers, the content of the learning trajectory and the fact that it is updated with new and relevant information every year. One way to guarantee the necessary focus on curriculum alignment every year is to develop a systematic cycle of updating the online curriculum mapping tool. Moreover, it is crucial that time or assistance for staff is made available to keep the online curriculum mapping tool up-to-date. We experienced that offering workshops can be very helpful in this respect. Additionally, it is important to have enough technical staff available to assist when there appears to be a problem with the software program.

Conclusion

Overall, the process of making learning trajectories visible through the online curriculum mapping tool has brought a number of positive developments in the programs involved. As described in the case studies, the tool has played a facilitating role in curriculum development, alignment, and assessment, as well as enhancing student learning. Based on our experiences and the outcomes of our evaluation, the project has contributed to discussion, development, and visibility of learning trajectories, and the awareness among both students and teachers of overarching curricular alignment. To assess to what extent it has actually *improved* curriculum visibility, curriculum alignment, and the student learning experience, different research is needed, that goes beyond the scope of this article.

Participants in the pilot project appreciated that the tool offered an integrated approach, addressing both students and teachers, and both curriculum development and visibility, whereas other systems often focus on either one side or the other. The advantage of visible alignment of the curriculum for both teachers and students, is it holds both parties accountable. Staff can hold students accountable, students can question staff on the (assumed) alignment, and staff can call each other to account when courses do not align. In all four pilots, we have experienced how the tool can function as a facilitator of discussion and reflection in this respect. As mentioned by others, we have also observed an increase of collegial cooperation and discussion throughout the project (Sumsion & Goodfellow, 2004; Uchiyama & Radin, 2009).

Retrospectively, we believe that this might even have been the most valuable outcome: the fact that actively working with the tool can stimulate both staff and students never to take the curriculum for granted, but instead to think critically about the curriculum constantly and to assess one's own position within that curriculum. This allows for an understanding of curricula and learning trajectories as something that is not fixed or given, but always open to change and improvement. The curriculum in this respect could be seen as a dynamic, slowly evolving entity instead of a static fixed program.

We do strongly believe that our tool has contributed to a collaborative and cooperative approach towards curriculum review and improvement, allowing different stakeholders to be heard in the discussion, and preventing curriculum review and development from being reduced to a top-down exercise in the dominant logic of outcome-based education. This might well be not just an interesting 'side effect' of the tool, but precisely its core value.

Acknowledgment

Many thanks go to Joris Veenhoven (Centre of Education and Learning, Utrecht University) for his indispensable advice and support for our project. Furthermore, thanks go to the members of the Utrecht University project group on Visible Learning Trajectories: Harold Bok, Frits Flesch, Hidde Leplaa and Lonneke Schellekens.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This work was supported by the Utrecht Education Incentive Fund (Utrecht University)

Notes on contributors

Leoniek Wijngaards-de Meij is Associate Professor and Director of Education at the Department of Methodology and Statistics of the Faculty of Social and Behavioral Sciences. She teaches on several undergraduate and graduate programs, as well as post graduate courses. Her current research focuses on admission processes and academic achievement in Higher Education.

Sigrid Merx is Assistant Professor at the Department of Media and Culture Studies of the Faculty of the Humanities. She teaches on the undergraduate program Media and Culture and in the graduate program Contemporary Theatre, Dance and Dramaturgy. Her current research focuses on the dramaturgy of contemporary socially-engaged theatre and performance practices, in particular performative interventions in public space.

References

Allen, M. J. (2004). *Assessing academic programs in higher education*. Bolton, MA: Anker.

Anderson, T. (2008). *The theory and practice of online learning*. Canada: Athabasca University Press.

Ausubel, D. P. (1960). The use of advance organizers in the learning and retention of meaningful verbal material. *Journal of Educational Psychology, 51*(5), 267–272. doi:10.1037/h0046669

Bath, D., Smith, C., Stein, S., & Swann, R. (2004). Beyond mapping and embedding graduate attributes: Bringing together quality assurance and action learning to create a validated and living curriculum. *Higher Education Research & Development, 23*(3), 313–328. doi:10.1080/0729436042000235427

Biggs, J., & Tang, C. (2007). *Teaching for quality learning at university*. New York, NY: Society for Research into Higher Education & Open University Press.

Carr, W., & Kemmis, S. (2003). *Becoming critical: Educational knowledge and action research*. London: Routledge.

Diamond, R. M. (2008). *Designing and assessing courses and curricula: A practical guide*. San Francisco: John Wiley & Sons.

Dyjur, P., & Lock, J. (2016). Three strategies for moving curriculum mapping online. *Educational Developments, 17*(2), 15–19.

Fink, L. D. (2003). *Creating significant learning experiences: An integrated approach to designing college courses*. San Francisco, CA: Jossey-Bass.

Fraser, S., & Bosanquet, A. M. (2006). The curriculum? That's just a unit outline, isn't it? *Studies in Higher Education, 31*(3), 269–284. doi:10.1080/03075070600680521

Fraser, K., & Thomas, T. (2013). Challenges of assuring the development of graduate attributes in a Bachelor of Arts. *Higher Education Research & Development, 32*(4), 545–560. doi:10.1080/07294360.2012.704594

Harden, R. M. (2001). AMEE Guide No. 21: Curriculum mapping: A tool for transparent and authentic teaching and learning. *Medical Teacher, 23*(2), 123–137. doi:10.1080/01421590120036547

Healy, H. (2011). Factors that enhance the implementation of a curriculum framework for religious education. *Religious Education Journal of Australia, 27*(1), 30–36.

Merrill, M. D. (2002). First principles of instruction. *Educational Technology Research and Development, 50*(3), 43–59. doi:10.1007/BF02505024

Neame, C. (2013). Democracy or intervention? Adapting orientations to development. *International Journal for Academic Development, 18*(4), 331–343. doi:10.1080/1360144X.2012.711966

O'Neill, G., Donnelly, R., & Fitzmaurice, M. (2014). Supporting programme teams to develop sequencing in higher education curricula. *International Journal for Academic Development, 19*(4), 268–280. doi:10.1080/1360144X.2013.867266

Spencer, D., Riddle, M., & Knewstubb, B. (2012). Curriculum mapping to embed graduate capabilities. *Higher Education Research & Development, 31*(2), 217–231. doi:10.1080/07294360.2011.554387

Sumsion, J., & Goodfellow, J. (2004). Identifying generic skills through curriculum mapping: A critical evaluation. *Higher Education Research & Development, 23*(3), 329–346. doi:10.1080/0729436042000235436

Uchiyama, K. P., & Radin, J. L. (2009). Curriculum mapping in higher education: A vehicle for collaboration. *Innovative Higher Education, 33*(4), 271–280. doi:10.1007/s10755-008-9078-8

Wang, C. (2015). Mapping or tracing? Rethinking curriculum mapping in higher education. *Studies in Higher Education, 40*(9), 1550–1559. doi:10.1080/03075079.2014.899343