PADRE: A Method for Participatory Action Design Research

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Abstract. Action Design Research (ADR) is a Design Research (DR) method that enriches the Design Science Research (DSR) paradigm, by providing stages and principles for designing artifacts and allowing for their emergence in an organizational context. The method has been used and elaborated by scholars, extending the mode of the method and its stages, incorporating and adopting knowledge from related approaches such as Participatory Action Research (PAR) and Participatory Design (PD). In this paper, we have adopted principles and philosophy from PAR and PD to extend and elaborate the ADR method, by providing a front-end of Action Research (AR) that emphasizes learning through incremental iteration. We will introduce our elaborated method as Participatory Action Design Research (PADRE) and demonstrate how we have used it in our own research. We argue that the ADR method can benefit from incorporating learning within and across each and every stage iteratively. We also argue that learning can be used as a learning nexus, which informs and gets accumulated for formalization of learning that can be re-used within different cycles of ADR. Hence, we introduce PADRE and provide a model that consists of a set of key-components, which extends and elaborates the ADR method.

Keywords: Action design research · Participatory action design research · Design science research

1 Introduction

Since Hevner et al's [1] seminal paper in MISQ, the Design Science Research (DSR) paradigm has flourished and the volume of DSR publications has increased dramatically [2]. As a research approach, DSR provides and enables researchers to develop a body of knowledge based on technology invention [3], which practitioners (e.g. system designers) can use as technology application (e.g. systems design) [4]. In terms of generating scientific knowledge, DSR generates abstract and practical knowledge, where the first-mentioned deals with development of design principles and design theories [5–7], and the latter emphasizes ways of building and of evaluating IT-artifacts to address a general class of problems [8, 9].

As a further development to the DSR paradigm, Sein et al. [10] introduced the Action Design Research (ADR) method. The ADR-method is a design-research

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method for generating prescriptive design knowledge through building and evaluating ensemble IT artifacts in an organizational setting [10]. More specifically, the ADR-method emphasizes two major challenges: **(1)** addressing a problem situation encountered in a certain organizational setting by intervening and evaluating; **(2)** constructing and evaluating an IT-artifact, which addresses the class of problems typified by an encountered situation. Sein et al [10, p. 4] state that: "*A new research method is needed to conduct Design Research that recognizes that the artifact emerges from interaction with the organizational context even when its initial design is guided by the researchers' intent. We propose ADR as such a method*". In other words, Sein et al [10] propose that new information systems are or should not be designed and developed in isolation from the organizational environment(s) that they would be used in. Instead, they propose that there should be a tight relation between the research activities of building, intervention, and evaluation (BIE) in a cycle, together with extensive participation by key stakeholders such as researchers, practitioners and end-users. Hence, they provide a research model emphasizing four different stages incorporated with guiding principles (shown in Fig. 1).

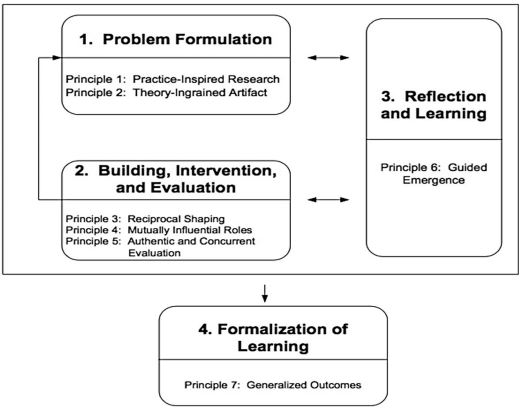

Fig. 1. ADR method: stages and principles [1]

In the course of our own research [11], we conducted research activities adopting the stages and principles of the ADR method (shown in Fig. 1). Thus, an intervention project was initiated in 2013 and ended in 2015, emphasizing building, intervening and evaluating an IT-artifact for conducting and distributing civic orientation through E-Learning [12–14]. The intervention project was conducted at a municipality in Sweden in close cooperation with stakeholders (e.g. practitioners, end-users) involved in the project, both on a conceptual and practical level, designing and evaluating the IT-artifact [13].

After conducting our first ADR-cycle, we discovered that we had applied the ADR method, incorporating activities for reflection and learning from the beginning to the end. Doing so, we had established a reciprocal space for interaction with the stakeholders. Such reciprocal space involved stakeholders from day one through

participatory workshops, design workshops, and collaborative activities emphasizing early learning outcomes. We also realized that we had applied ADR to a complex, "wicked" problem, where no explicit artifact existed to address the problem of replicating the distribution of civic orientation through E-Learning. Thus, we were forced to re-examine how the ADR method provides necessary means for encapsulating and distributing early learning outcomes, which can incrementally and iteratively be formalized and used to resolve emerging challenges throughout the process of one to many ADR-cycles.

1.1 Problem

After our first conducted ADR-cycle, we studied further how the ADR method emphasizes reflection and learning in terms of guided emergence, where researchers "*move conceptually from building a solution for a particular instance, to actually applying that learning to a broader class of problems*" [1, p. 8]. This guidance is incorporated throughout the third stage of ADR, where reflection and learning is regarded as a separate stage. However, our learning outcomes from the first ADR cycle provided us insights for how to conduct the second cycle by deliberately establishing an early space for reciprocal reflection and learning with the stakeholders. Hence, we implemented our idea throughout the second cycle, and formulated the following research question for this paper:

- **RQ:** *How can the ADR method be elaborated to incorporate reflection and learning through early-embedded cycles of iteration, providing actively involved stakeholders and researchers an early reciprocal space for reflection, learning and action iteratively?*

1.2 Purpose

Based on the research question and our own experiences adopting the ADR-method, we started reading literature about how participatory research approaches, such as Participatory Action Research (PAR) and Participatory Design (PD), advocate solving problems and encapsulating learning outcomes during early stages of research activities [15–17]. We also identified how other scholars have approached extending the ADR method into flexible modes of elaboration [18], imposing participatory action research as a complementary for ADR [19]. Hence, the purpose of this paper is to present our findings as an elaborated version of the ADR method, and to advocate how early reflection and learning can be integrated into each and every stage of the ADR-model.

We emphasize the need for: **(1)** a participatory approach with researchers and practitioners co-creating knowledge at each step in the ADR-cycle; **(2)** a need for a learning activity at each stage in the ADR-cycle that informs participants in that stage and informs the planning for the next stage in the ADR-cycle. We believe that two points are crucial for our elaboration, which we will present as PADRE (a method for Participatory Action Design Research). But before doing so, we will present related

research emphasizing Mullarkey and Henver's [18] and Bilandzic and Venable's [19] contributions. We stress that their contributions are important elaborations of the ADR method in general, and serve as source of inspiration for this paper in particular. Thus, the rest of this paper is structured as following: (1) we present related research; (2) we introduce PADRE; (3) we frame PADRE by describing how we have applied it in our own research; (4) we will discuss PADRE through an concluding discussion about PADRE's significance for practice and research.

2 Related Research

ADR as a method has been used to build and intervene ensemble artifacts within a wide range of application areas stretching from museums [20], to service development [21], to end-user development [22, 23] and other interconnected areas, which justifies ADR in practice and theory [24, 25]. But more relevantly, scholars have also suggested extending the ADR method through various forms of elaboration [18, 19]. However, we have through literature reading identified two works that we address as highly relevant for this paper. Hence, we will in the upcoming sub-sections present and discuss these two relevant works. Our choice with choosing and presenting the following two works is based upon their conceptual relevance to our own conducted research, and their significance in terms of inspiration, rigor and research within the frame of DSR in general, and ADR in particular.

2.1 Developing Action Design Research Further

Recently, Mullarkey and Hevner [18] presented an extended model of the ADR method, by expanding the method with two up-front activities and multiple entry points for entering the ADR method. They argue that: "*ADR tends to suggest a single design science research entry point focused on an existing information system using an action research cycle from problem formulation to build, intervention and evaluation*" [18, p. 133]. They proposed an extension to the original ADR model by introducing a problem diagnosing and concept design stage, together with the possibility of multiple DSR entry points shown in Fig. 2.

Figure 2 depicts for an ADR-process that provides multiple entry points for researchers to flexibly facilitate their research contributions, often required to obtain publication in top tier journals. Mullarkey and Hevner's [18] model incorporates the DSR model presented by Peffers et al [26] and elaborates the ADR method to be effective at the earliest possible entry point in Peffers et al's [26] model. The model also suggest that the activities of intervention, evaluation and reflection on learning cycles, can exist across stages as well as at each stage in the artifact development. The triangles in the model indicate a modification of Sein et al's [10] original BIE-triangles, offering to describe the activity at each stage of the fully elaborated ADR together with each entry point. However, Mullarkey and Hevner's [18] model puts less focus on *how* to actually involve stakeholders and engage them early on throughout an ADR cycle. The model does not explicitly emphasize any methodological constraints in terms of

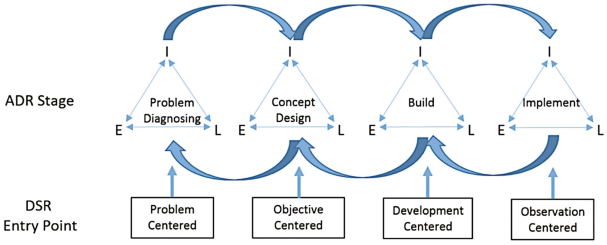

Fig. 2. ADR continuum with stages and entry points [18]

incorporating other relevant research approaches (e.g. PAR) as an extended component for the ADR method. However, the model is an excellent contribution in terms of facilitating flexible entry points for conducting ADR at various levels of engagement (e.g. objective centred, development centred). But the model could benefit from incorporating guidelines and principles on *how* to actually establish embedded cycles of iteration throughout the process of intervention, evaluation and reflection on learning. We will elaborate further on such notion through the idea of PADRE. But before doing so, we will in the next section present the relevant works of Bilandzic and Venable [19].

2.2 Towards Participatory Action Design Research for Urban Informatics

Bilandzic and Venable [19] propose a new research method for studies in the urban informatics domain. They introduce their research method as PADR (Participatory Action Design Research) for urban informatics. Their research method supports urban informatics research in developing new "technological means" to resolve contemporary issues, to support everyday life in urban environments [19] The need for PADR as a research method derives from the nature of urban informatics, which is situated in a socio-technical context. Therefore, PADR combines Action Research (AR) and DSR by adapting them to the cross-disciplinary needs and research context of urban informatics.

PADR incorporates different aspects of AR and DSR, and is constituted through five phases or activities: diagnosing, action planning, action taking design intervention (s), impact evaluation and learning and creation of actionable knowledge for the client, which in the context of urban informatics is the same as city planners, government, developers, local organizations and the public in general. Figure 3 depicts each and every phase of PADR.

PADR starts by activities for diagnosing and problem formulation. In the second phase, the authors state that it is important that the participants are involved as co-planners for taking action (e.g. the design of new technology). Activities such as design, development and evaluation of new technology shall be planned through increased participation for a realistic evaluation.

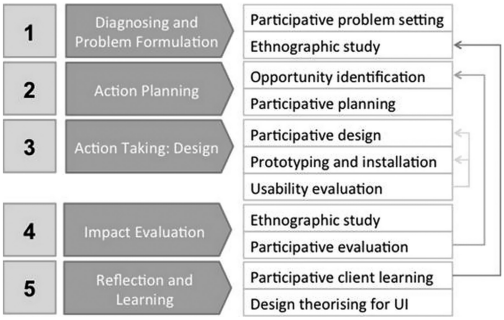

Fig. 3. Participatory action design research - a research method for urban informatics [19]

During the third phase, PADR is concerned with the actual design and development of the technology, as well as early testing. The phase involves participative design, prototyping and usability evaluation [27, 28]. However, Bilandzic and Venable [19] take distance from using ADR for prototype evaluation. Instead, they advocate for DSR-recommendations deriving from Baskerville et al. [29], who identify evaluation goals and how to achieve them using a combination of ex ante and ex post evaluations.

In the fourth phase of impact and evaluation, the overall goal is based on a collection of researchers, clients, and stakeholders collaboratively working together to define actions for design-interventions, which are then evaluated. Usability evaluation methods are borrowed from Human Computer Interaction (HCI) to provide insights to the HCI community about new artifacts and methods being used in the real world instead of an isolated laboratory.

In the fifth and final phase, participants are encouraged to collaboratively enable clients and stakeholders to carefully reflect upon valuable insights and learning from previous activities and phases. The authors stress that it is important that reflection and learning gets communicated to those involved in a PADR research project. They also suggest that such knowledge gets formulated and communicated as Urban Informatics Design Theories, as opposed to design theories in DSR [4–6].

In summary, Bilandzic and Venable's [19] method incorporates principles and concepts from a wide range of different research approaches such as Action Research, Design Science Research, Human Computer Interaction, Participatory Design and many more. The essence of PADR lies in adapting and offering an aggregated model, which applies streams of participatory action oriented methods for urban informatics. The method emphasizes the importance of involving and engaging relevant stakeholders through a participatory approach, where activities for design, development and evaluation is conducted collaboratively. However, reflection and learning is formalized as a last phase in the method, and not iteratively throughout the whole process of a PADR project.

3 PADRE (A Method for Participatory Action Design Research)

Inspired by works of Mullarkey and Hevner [18] and Bilandzic and Venable [19] and drawing on insights gathered from our own research project [11–13], and literature on PAR and PD [15–17, 27, 28], we will in the upcoming sections introduce PADRE, a method for Participatory Action Design Research.

3.1 The Basic Idea of PADRE

The idea of PADRE is to elaborate Sein et al's [10] ADR-method. PADRE stresses that reflection and learning can occur early on throughout the stages of problem formulation and BIE. Mullarkey and Hevner's [18] flexible model for entering action design research, also points at similar directions, incorporating reflection and learning at different levels of ADR activities (see Fig. 2). In line with Mullarkey and Hevner [18], we suggest that reflection and learning can be established early in an ADR project, providing an ADR-team iterative cycles of activities for planning, implementing, observing and reflecting for learning. PADRE is therefore inspired by principles deriving from PAR and PD, advocating for tight interaction between stakeholders and researchers, including and engaging the stakeholders throughout each and every stage in an ADR cycle. Such philosophical underpinning is already informed through the stages and principles of ADR. However, the ADR method doesn't provide an explicit notion on how to establish early iterative cycles of reflection and learning for each and every stage of the ADR-process. PADRE addresses such issue by incorporating principles from PAR and PD, which informs how to engage stakeholders and researchers into a reciprocal space for early iterative cycles of reflection and learning.

3.2 The Relation Between PADRE, PAR and PD

PADRE adopts, and is inspired by principles deriving from PAR and PD. The participatory nature of PADRE, suggests that it is important to build effective relations between stakeholders and researchers in an ADR project. Such relations shall be established early in a PADRE-project, based on a mutual understanding of the stakeholders' goals and motivations of solving crucial problems through an intervention. Early needs and requirements shall govern reciprocal dialogues between stakeholders and researchers. The dialogues are crucial for establishing mutual understanding through extensive forms of active participation throughout the whole process of formulating problems, to actually presenting and discussing action implications [16, 30].

We suggest that PAR and PD are relevant and sufficient in terms of establishing a "community perspective" between stakeholders and researchers, rather than a simple dichotomy that distinguishes them in terms of their specific roles in an ADR project. The community perspective goes in line with PADRE's notion of building a reciprocal space for early cycles of iterative reflection and learning between stakeholders and researchers. Furthermore, the community perspective offers a sense of mutual

agreement between stakeholders and researchers, which affect the will of attitude and participation among the stakeholders in particular [15, 16]. Through such idea of establishing a community perspective, reflection and learning becomes crucial for stakeholders' and researchers' co-creation and sharing of learning outcomes in their community. For instance, researchers and stakeholders may iterate back and forth through mutual dialogues (e.g. through participative workshops), generating incremental suggestions for early prototyping and usability evaluation, which is then revised through an iterative manner into learning outcomes for a new cycle of iteration [27, 28]. The iterations are incrementally conducted until level of satisfaction and maturity of learning outcomes (e.g. formalized learning outcomes). Hence, depending on the nature of acquirement (e.g. problem formulation or solution search), the iterations may be one to many.

A further notion of systematizing the participatory philosophy of PADRE is illustrated in the next section. We will present the structure of PADRE, and illustrate the constitution of the structure through 4 key-components.

3.3 The Structure of PADRE

PADRE consists of four key-components together with comprising activities that inform each and every component. Figure 4 depicts and illustrates each and every component of PADRE.

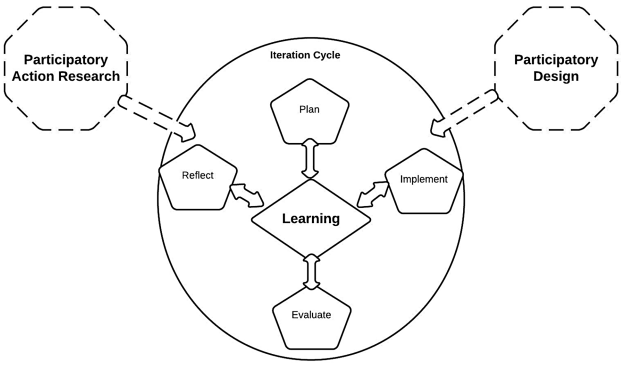

Fig. 4. The structure of PADRE

The first key-component is the component **Plan**. A PADRE project is initiated through planning activities for identifying needs and requirements that address knowledge requirement and need of artifact intervention. This initial stage is similar to the problem diagnosing and concept design stages in Mullarkey and Hevner's [18] extended ADR model, where planning to implement an early prototype of the artifact is possible for further decision-makings. During the planning stage, stakeholders are extensively encouraged to participate and contribute with representative input towards requirements and needs in terms of artifact features [17]. This early stage establishes a reciprocal space

for interaction between stakeholders and researchers. The fundamental idea with such reciprocal space is based on an underlying participatory philosophy [30, 31], which aims to establish early reciprocal understanding towards identifying potential problems and solutions. Together, researchers and stakeholders create an atmosphere where participants are encouraged to engage themselves in relevant questions, which are addressed through each participant's base of knowledge and role (e.g. researcher, system developer, coordinator). Such reciprocal space may be established through early workshops (e.g. participative workshops) and training sessions together with stakeholders, providing mutual prerequisites for reflection and learning. During this stage a tight connection for co-creating an evolving research environment shall also be incorporated [31]. Finally, reflection and learning from the first stage results in early formulated needs, which are documented into the **Learning** nexus (positioned in the middle of Fig. 4) and addressed through implementation of an early prototype and system features.

The second key-component is the **Implement** component. Based on documented reflection and learning from the planning stage, the second component emphasizes PD-activities for implementing an early prototype together with prototype features that address formulated needs and requirements [27]. The prototype is, through the original ADR manner, implemented in the actual organization that it is going to be used in [10]. Stakeholders such as end-users and practitioners are, through guidance by the researchers, provided with early increments of the artifact for enhanced usability evaluation [28]. The implementation phase results into learning outcomes about the quality and usability of the early prototype features, together with how well they address stakeholders' early needs and requirements. Stakeholders establish an experience through interacting and testing the early prototype, which generates learning about the different functions of the prototype. In line with the PD-philosophy, learning gets transformed into insights about experienced moments with the prototype, which provides stakeholders more knowledge towards coordinating artifact roles (e.g. which stakeholder does what with the artifact) and revised functionality specification [27, 28]. The learning outcomes from implementing an early version of the documented plan, is documented into the **Learning** nexus and addressed further through evaluation.

The third key-component is the **Evaluate** component. Learning outcomes from the implementation component are documented and evaluated continuously through participative observations together with involved stakeholders. In line with PAR and PD, stakeholders are encouraged to learn how prototype features are used through observation and interaction [15, 16, 27, 28]. They interact with the features through participative activities such as regular meetings, workshops and training sessions, where they report what they want to refine in terms of prototype design and functionality. Hence, the stakeholders' and researchers' observations, leads to a mutual form of guided emergence, where participants of the workshops/sessions collaborate towards a refined version of the prototype. The learning outcomes from evaluating the implemented prototype, is documented into the **Learning** nexus and addressed further through collective reflections between the researchers and stakeholders.

The fourth and final key-component is the **Reflection** component. During the reflection stage, researchers and stakeholders present results and discuss proposed decisions for further action implications [16, 30]. Reflection is based on concrete experiences from the previous phases, emphasizing stakeholders' and researchers' learning outcomes from conducted workshops and training sessions. Each and every involved stakeholder is, together with the researchers, involved in a collaborative activity, providing each other general and/or specific input on further processing. Thus, in the end of the first iteration cycle, experienced knowledge is formulated as efficient learning outcomes for the second planned iteration cycle. It is during this stage, which the researchers and stakeholders decide whether the activities have generated satisfactory results for further endeavours. If the level of satisfactory is decided to be viable, then the preliminary plan gets revised and a new cycle of implementation, evaluation and reflection gets initiated. However, if the level of satisfactory is not decided to be viable, the PADRE-group identifies which activities to revisit. Such idea follows the philosophy of PAR, where decision-making becomes a collective choice between researchers and stakeholders [15, 16, 31]. Finally, the PADRE-groups' reflection outcomes gets documented into the **Learning** nexus and addressed for formalizing, documenting and communicating the learning outcomes.

The **Learning** nexus serve as a repository, or treasure chest of knowledge, which is filled with accumulated knowledge from planning, implementing etc. Hence, learning is embedded as an outcome and not as a separate stage of activities. Learning gets established through performance of planning, implementing, evaluating and reflection. Therefore, it is essential to document learning in various forms of findings (e.g. specified needs and requirements, identified artifact features) and at various levels of the PADRE-process (e.g. first iteration, second iteration) [15, 16, 27, 28]. Finally, the learning nexus is considered being established in the intersection of the PADRE-components (shown in Fig. 5).

Figure 5 depicts the interrelation between key-components of PADRE and the Learning nexus. We identify learning in the intersection between PADRE's 4 key-components and address it as a nexus because it serves as an embedded repository of knowledge for both researchers and stakeholders involved in a PADRE-project. The content of the learning nexus can both be used for initial inquiries (e.g. problem formulation) and/or final satisfactory results. Hence, if an iteration cycle has generated satisfying results for further activities, the learning outcomes may be formalized, documented and communicated in an appropriate form. The medium of appropriation is chosen depending on what the community of researchers and stakeholders believe is appropriate. For example, if the learning outcomes are only relevant for implementing an early version of the artifact, then the researchers may formalize their findings as design implications. But if the learning outcomes are a product of several cycles of iterations, then maybe the artifact is fully usable, and the researchers may decide to formalize learning outcomes into governing design theories.

We will in the next section, through a narrative manner, demonstrate how we have used PADRE in our intervention project [11–13]. We will emphasize the operationalization of PADRE's key-components, and illustrate their utility.

Fig. 5. The interrelation between key-components of PADRE and the learning nexus

4 Demonstrating PADRE

In this section, we demonstrate how we have used PADRE in a recent intervention project. The intervention project was initiated in December 2013 and was accomplished in mid 2015. A comprehensive project description has already been reported (11), but overall, the project was comprised by activities for building, intervening and evaluating an IT-artifact for conducting and distributing civic orientation through E-Learning [12–14].

The IT-artifact for civic orientation consists of features for informing newcomers about how the society works in terms of laws and regulation, democracy, societal norms and values etc. The IT-artifact also consists of features for organizing, maintaining and distributing learning material [13]. The target group for learning civic orientation is immigrants entering Sweden (newcomers), but the target group for using the IT-artifact for conducting and distributing civic orientation is a constellation of teachers, administrators and coordinators at a municipality in Sweden.

Our roles as researchers have been to: (**1**) build, intervene, and introduce technology, which expands the method of distributing civic orientation throughout different counties in Sweden; (**2**) establish organizational and pedagogical strategies for distributing civic orientation through E-Learning. We will therefore for the sake of reliability and validity of PADRE, demonstrate how we have implemented PADRE. Relevant stakeholders such as teachers, administrators and coordinators, have all been included as participants throughout the cycles of our research. Hence, we will now step by step demonstrate how we have utilized the key-components of PADRE in our own research.

4.1 Plan

In the **planning** stage, we used learning outcomes in terms of early-defined design implications [11] and tentative design principles [12] from the first cycle to formulate a plan for a revised implementation of the early artifact prototype. We established a reciprocal space by involving the stakeholders as co-creators [30, 31]. We involved them in supplementary courses in how to use early-defined artifact features for distributing civic orientation through E-Learning. We introduced the concept of E-Learning together with IT-tools (e.g. cloud services, content management systems) that opened up for dialogues among the participants, encouraging them to express a notion regarding their initial problem/solution-awareness. During the phase of discussing and identifying new artifact-requirements, we conducted participant observations, workshop sessions and semi-structured interviews with the stakeholders, to adapt their original needs and requirements into new ones.

Literature on how to involve stakeholders as co-researchers [16, 31] reduced the level of ambiguity, by informing us guiding principles on how to engage stakeholders and let them create their own added value into the project through democratic PD workshops [27, 28]. The PD workshops engaged stakeholders to vote for their top five most-wanted features, by writing them down on post-its and then presenting them one by one for every workshop participant. The workshops resulted into a democratic decision, where the participants had to choose collectively which features they thought were most appropriate for further implementation. Learning outcomes from the planning stage were documented through protocolling.

4.2 Implement

Based on the results from the planning stage, we decided to explore a new direction by initiating a second phase of **implementation**. This time, the implementation phase was initiated by envisioning the stakeholders' collective decisions towards a revised plan for implementation. New artifact features for distributing online-courses in civic orientation were implemented, together with general artifact features and roles for administration. Artifact features addressing administrative activities such as producing, maintaining, updating and distributing learning material, were implemented for the administrators. New technology was introduced and a new cycle of learning the new technology (e.g. interface features) was initiated (Fig. 6).

We also implemented embedded versions of power point material for the teachers, which they use as didactic tools during the course of their teachings. Each and every power point represents a certain theme within the civic orientation program (e.g. democracy, norms and values). Each theme is distributed online, and informed to the students collectively (e.g. classroom teachings) and individually (e.g. E-Learning). The new prototype featured as both being a tool for teachings in the classroom, and a tool for distributing civic orientation through E-Learning. Learning outcomes from the implementation stage were documented through field-notes and video recordings.

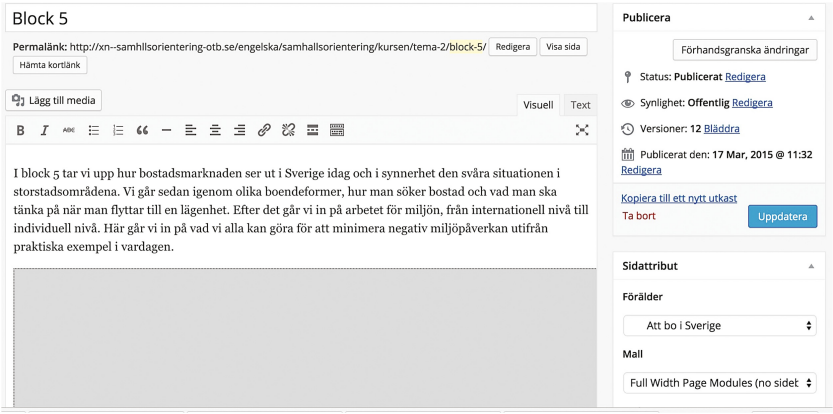

Fig. 6. Admin-features for online-distributed civic orientation

4.3 Evaluate

After implementing a new version of the IT-artifact, we **evaluated** the outcomes through usability testing and evaluation. We arranged a participative workshop together with the stakeholders. The theme for the workshop was to enhance the stakeholders' awareness towards becoming independent of us as researchers in the context using the artifact features. In other words, we conducted the workshop through a set of learning modules, providing them basic know-how towards how to use the different set of artifact features according to their revised needs and requirements (e.g. the revised plan). We introduced the revised version of the IT-artifact by arranging a set of tasks for each and every stakeholder. They got the chance to learn relevant aspects of the IT-artifact, according to their roles as stakeholders. For instance, administrators were provided with tasks relevant to their activities with producing, maintaining, updating and distributing learning material, while teachers were provided tasks relevant to their activities with informing civic orientation through E-Learning and classroom-teachings. Learning outcomes from the evaluation stage were documented through video recordings, sound recordings and field notes.

4.4 Reflect

The **reflection** stage was conducted through a focus group session together with the involved stakeholders. The focus group session was conducted 3 months after the IT-artifact had been implemented and evaluated. During the focus group session, the stakeholders where encouraged to answer questions coupled with their learning outcomes. For instance, the moderator of the session asked what the stakeholders have learned in terms of added values for their daily work with organizing, teaching and distributing civic orientation. The stakeholders shared their opinions through a roundtable discussion, where each and every stakeholder established a view about their individual learning outcomes and the impact of being involved as co-creators in each

and every stage of the project (e.g. planning, implementing). The focus group session ended with a final roundtable discussion, but this time, the stakeholders were encouraged to (individually) present one valuable reflection per stakeholder. More specifically, each and every stakeholder shared a story regarding, what they considered, being the most valuable lessoned learned throughout the stages of the project. The focus group session was documented through video recording together with field-notes and sound recordings.

5 Discussion and Findings

Our paper is built upon the notion of how the ADR method can be elaborated to incorporate reflection and learning through early-embedded cycles of iteration, providing involved stakeholders and researchers a reciprocal space for reflection, learning and action. We drew inspiration from participatory research approaches such as PAR [16, 31] and PD [27, 28] and extensions of the ADR method [18, 19]. We summarize our contributions for this paper as follows: (**1**) empirical findings from actual ADR efforts have proven that the iterative, co-creative (participative) learning need to occur within each stage. PADRE incorporates learning as an embedded nexus within each and every cycle. Hence, learning is an integrated component of each stage, and not a separate stage; (**2**) empirical findings from conducting the second cycle generated an understanding towards how learning can inform the planning phase of an ADR-stage, and how it might in some cases inform a re-iteration of a current ADR-stage. **3)** PADRE provides explicit steps for conducting an iterative, reflective, learning cycle that informs practice and research at each stage in the conduct of ADR.

Given the contributions above, our findings may merit and contribute to the evolution and elaboration of ADR, by integrating the structure of PADRE as embedded cycles (shown in Fig. 7).

Figure 7 depicts and illustrates how ADR can be elaborated through embedded versions of iteration cycles. The key-components **planning**, **evaluating, implementing** and **reflecting** adopts and provides ADR complementary activities, which emphasizes learning as an integrated nexus within each and every iteration cycle; learning is integrated and established through an iterative interaction between PADRE's key-components, and learning outcomes can be back-tracked across the ADR-stages.

A rationale for PADRE's structure within and across the ADR-stages is formulated as following: (**1**) **Planning** is designed for problem formulation, BIE-activities and formalization of learning, by adopting PAR through collective processes of self-investigation within the context of research and intervention [16]. A first plan can be revised depending on the level of satisfaction among researchers and stakeholders. The plan gets revised through iteration and collected knowledge within and across the ADR-stages. For example, an early designed prototype of the IT-artifact is implemented and observed in its actual context of use. Reflection and learning gathered from BIE-activities, is encapsulated in the learning repository, and used as insights for the new revised plan.

(2) Implementing is designed for presenting a structured problem formulation, implementing an early designed prototype or encapsulating design knowledge through

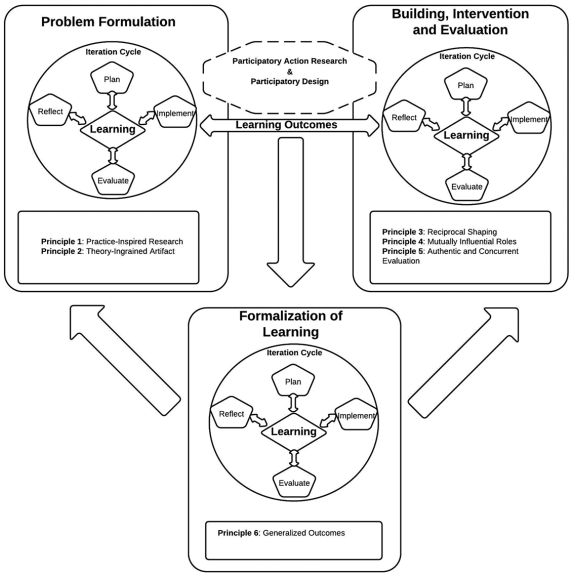

Fig. 7. PADRE implemented into ADR

design principles in a design theory. A first version of implementation guides the PADRE-team to work actively together. Throughout this activity, researchers are encouraged to increase the level of stakeholder empowerment and democratization through direct participation of stakeholders in system analysis and design work [27]. Outcomes from implementing a reciprocally shaped result (e.g. problem formulation, early prototype) are managed iteratively within and across each and every ADR-stage.

(3) Evaluating is designed based on the outcomes from ADR-stages, providing the reflecting phase input on lessons-learned and learning outcomes in general. Learning about how to revise an initial problem formulation or designed prototype, is established through the involvement of a broad set of sources for input (e.g. focus groups), rather than a small number of stakeholder representatives. Observational outcomes serve as means for reflection upon previous key-components (e.g. planning and implementing).

(4) Reflection is the key-activity that creates transparency for initiating a new round of iteration by settling accomplished tasks into relation with newly identified challenges and issues, which derive from previous key-components (planning, implementing and evaluating). Such insights can be early established through the first iteration cycle, but also flourish into more profound forms of reflection that emphasize outcomes from several cycles of iteration. Reflection fulfills the iteration cycle, but also initiates a new cycle of iteration depending on the level satisfaction with accomplishing tasks within and across the ADR-stages.

As we have stressed before, our own experiences with utilizing the rationale of PADRE in an ADR-cycle, demonstrated how to establish a reciprocal space for reflection, learning and action iteratively (when needed). Such reciprocal space, nurtures a sense of community feeling among the researchers and stakeholders, where they

reciprocally can structure and share knowledge and learning during and after a project. Thus, learning and knowledge is integrated into the rationale for PADRE through the learning nexus (shown in Fig. 7). The learning nexus is fed with knowledge and learning during and after the activities of PADRE (e.g. planning). The researchers and stakeholders can whenever they want, use the learning nexus to store knowledge and learning (e.g. documenting findings), retrieve knowledge and learning outcomes (e.g. early design implications), but also share knowledge and learning after a project (e.g. formalized design principles). We believe that, in order for such continuous learning process to occur, the researchers and stakeholders need to interact in an atmosphere that adopts and reciprocal space for reflection, learning and action taking. Hence, we believe that the use of PADRE can establish an early sense of community feeling among researchers and stakeholders, allowing them to reciprocally identify goals, problems and solutions, which they can address throughout an entire cycle of PADRE-activities. Doing so, early learning outcomes can be fed into the learning nexus, and used for further iterative evolvement in a project.

6 Further Research

Although we have demonstrated the reliability and validity of our suggested elaboration on the ADR-method, PADRE is still its innovative state of progression. In order to prove the full potential of PADRE, we believe that we need to test it on a class of problems, which we haven't addressed for this paper. Therefore, a next stage in the development of PADRE would be to do so, and provide a revised version of PADRE. Doing so, we would actually follow our own suggested principles of generating learning outcomes through iterated forms of cycles. Furthermore, we address the limitations of our work through potentials for further research. More specifically, we believe that our work is a result of accumulated knowledge, where ADR serve a foundation for relevant works of Mullarkey and Hevner [18] and Bilandzic and Venable [19], which in turn served as sources of inspiration for our work.

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