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Power to the facilitated agricultural dialogue: an analysis of on-farm demonstrations as transformative learning spaces

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ABSTRACT

Purpose: It remains a critical question how to support farmers to develop towards more sustainable practices. Earlier experiences reveal that on-farm demonstrations (OFDs) can be part of the answer. Therefore, we investigate OFDs as potential transformative learning spaces.

Methodology: We apply a mixed methods approach, using an observation tool, participant surveys and telephone interviews. We compare 15 different OFDs, divided into two groups: OFDs with and without facilitated dialogue. We investigated differences based on core inducing processes of transformative learning: disorienting dilemma and (self-)reflection. Additionally we investigated the adoption decision making process half a year after the OFD took place.

Findings: Participants in facilitated dialogue OFDs agreed significantly more on experiencing surprise, an indication of disorienting dilemma, and on having reflected and learned. Most mentioned adoption barriers are a lack of relevance for the specific situation and a need for more information. Most mentioned suggestions indicate a request for more real life application.

Practical implications: This research indicates that OFDs with facilitated dialogue can trigger more cognitive conflict and reflection processes of attendees, and thus support learning processes on (more) sustainable agricultural practices, as opposed to OFDs without deliberate dialogue facilitation.

Theoretical implications: Our study demonstrates that transformative learning theory can inform research on agricultural learning spaces, such as OFDs, on effective triggers to support learning and competencies towards more sustainable agriculture.



Originality: Based on rich empirical quantitative and qualitative data we reveal that facilitated dialogue enhances learning during OFDs, but this does not seem to be a common practice.

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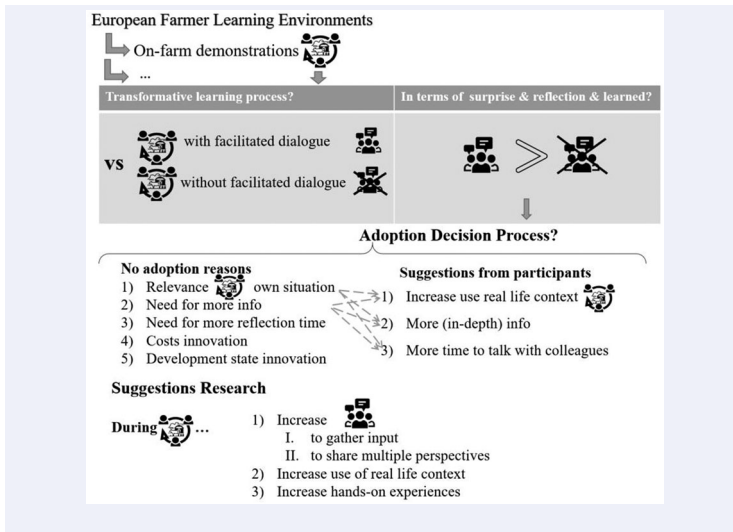
KEYWORDS

On-farm demonstration; transformative learning; peer learning; facilitated dialogue; surprise; reflection; adoption decision process

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Introduction

Food security is one of the targets under the 17 Sustainable Development Goals (SDGs) (United Nations General Assembly 2015). Farmers can contribute to this SDG by managing their natural resources, adapting to climate change, and overcoming barriers in information and knowledge. At present, support in spreading and sharing innovative agricultural knowledge and practices towards and between farmers can entail a more complex system of knowledge exchange compared with the past (Swanson 2010). In this regard, it is advocated for to encourage participatory, more bottom-up, agricultural advisory approaches, since they are associated with a number of benefits including higher rates of adoption and practice change, positive effects on yield, income, and well-being, increased knowledge and skills; and the availability of peer support (Ingram et al. 2018; Prager & Creaney 2017; Swanson 2010). We argue that on-farm demonstrations (OFDs) as an agricultural knowledge exchange activity (Leeuwis and Van den Ban 2004) fit well in this shift towards more participatory agricultural education activities, since these events have the potential to facilitate dialogue between attending farmers and other interested parties, for example researchers, advisers and suppliers. However, we ascertain that improvement in utilising of the full potential of OFDs as strong learning environments in Europe would be beneficial (Marchand et al. 2019) and a step forward in reaching the SDG.

An OFD is understood in this research as a demonstration activity (or event) for providing farmers with ‘an explanation, display, illustration, or experiment showing how something works’ (Collins English Dictionary) that can be subsequently transferred to their own farming practices to bring about positive changes on their farm (Adamsone-Fiskovica, Tisenkopfs, and Grivins 2017; Ingram et al. 2018). A varying number of agricultural experts (researchers, farmers themselves or others) can take up the role of demonstrator during an OFD. In addition, the organisation, number of participants and duration of an OFD can all take different forms depending on the context. OFDs, as the word implies, take place preferably on actual working farms, or in a context as

realistic as possible. Hence, the demonstration can be visualised in real-life conditions to which farmers can relate (Marchand et al. 2019). OFDs could thus be deployed for more traditional transfer of knowledge activities, but also for actively engaging bottom-up learning activities. These activities could include providing the opportunity for farmers and other attending interested parties to: discuss together with both peers and experts, jointly solve problems, compare practices in similar contexts to their own, as well as experience hands-on activities (Adamsone-Fiskovica, Tisenkopfs, and Grivins 2017; Ingram et al. 2018).

Consequently, in this study, OFDs are seen as potentially stimulating peer learning spaces and we will use transformative learning theory to scrutinise this type of learning. More specifically, the concepts of disorienting dilemma (or cognitive conflict) and critical (self-)reflection will be used to understand better learning triggers and outcomes, including when and how people apply new frames of reference (Diduck et al. 2012; Hoggan 2016). We acknowledge that farmers encounter a multitude of learning opportunities other than or complementary to what OFDs have to offer which can contribute to a transformative learning process. However, in this research we focus on OFD practices as important links in the chain towards transformative and societal change.

Potential role of facilitated peer learning during OFDs

Many studies report that farmers like to learn from peers who share reliable information (Davis et al. 2018; EIP-AGRI 2015; Franz et al. 2010) and that farmers' exchanges and farm visits (SAI Platform 2015) are one of the most efficient and preferred ways to bring the right information to most farmer groups. These studies endorse the call for re-orienting the traditionally used top-down technology transfer model in agricultural extension, in which communication is one-way, from extension staff to farmer-trainers to farmers, to a more demand-driven, participatory model (Davis et al. 2018; Ison et al. 2012). However, we approach farmer-to-farmer learning experiences as part of a wider system of learning opportunities, within and outside the Agricultural Knowledge and Innovation System (AKIS) (EU-AKIS 2019). They ideally exist in synergy with researcher-farmer learning experiences and learning groups consisting of different types of agricultural stakeholders (Hoffmann, Probst, and Christinck 2007). In other words, agricultural experts, who are not farmers themselves, continue to have an important role in the communication or co-creation of knowledge (Hamunen et al. 2015; Leeuwis and Van den Ban 2004; Oreszczyn, Lane, and Carr 2010). We do not seek to replace this role of agricultural experts, but to complement it with farmer-to-farmer learning experiences. In this participatory way researchers, farmers and other stakeholders can bring their own expertise to the table. OFDs can be the ideal space to foster these dialogues and discussions between as many attending participants as possible, stimulated and guided by someone taking up the facilitator role. This facilitator could be for example an adviser or organiser, but also a demonstrator or the host farmer taking up an extra role. For this type of guided knowledge exchange during which different attending participants can share their views and opinion, we use the term 'facilitated dialogue' in the rest of this study. This can include a multitude of methods and activities that stimulate sharing and discussion of knowledge. Conceptually, peer learning can stimulate two-way (or more), reciprocal learning experiences (Topping 2005). However, we may not assume that effective peer learning occurs

spontaneously by bringing farmers together during an OFD. Emerick et al. (2016, 23) go as far as to state that ‘simply relying on farmers to share information without any further intervention will dampen adoption of improved agricultural technology’. Within a recent peer learning guide, admittedly aimed at more typical ‘classrooms’ as educational settings, renowned researchers in this field (Topping et al. 2017, 31) wrote: ‘as argued before, simply placing students in pairs or small groups will not necessarily result in the hoped-for learning effects. Instead, teachers need to apply specific interventions which make peer interactions in their classes constructive.’ As examples of reasons why sharing of knowledge between farmers does not evidently occur naturally, we refer to a study by Ingram (2010) who reported on a specific case on reduced tillage in the UK. The complex nature of the practice made some farmers reluctant to engage in networks. This was due to fear of criticism from other farmers, of competition, or poor regard for the standards of farmers new to the system. Many other studies on agricultural extension activities report facilitation as a key success factor (e.g. Kelly, Bennett, and Starasts 2017; Crawford et al. 2007; Cristóvão et al. 2009), as also two other studies in this issue of Adamson-Fiskovica et al. (2021) on disentangling critical success factors of OFDs and of Marchand et al. (2021) on the role of structural characteristics of OFDs.

The above-mentioned theory and empirical studies lead us to formulate the hypothesis that deliberately facilitating dialogue during OFDs between farmers and other attending parties, increases stimulation of transformative learning processes, compared to OFDs during which dialogue is not deliberately facilitated.

OFD participation as a potential step towards transformative learning

In our research, we will incorporate core processes from transformative learning theory. According to Mezirow’s theory (1978) it takes a 10-step process to undergo a personal transformation, resulting in change in one’s actions (step 10). Experiencing a disorienting dilemma followed by (self-)reflection are the first critical steps in this theory. We found relevance in transformative learning theory because it ‘offers a promising theoretical frame for promoting individual and social change necessary for action on sustainability, through its focus on transformation that produces far-reaching change in learners’ (Moyer and Sinclair 2020, 2). The theory continues to be the most researched and discussed theory in the study of adult learning (Taylor, Duveskog, and Friis-Hansen 2012) and has been reflected on in previous research on farmer learning and natural resource management aimed at a more sustainable future (Diduck et al. 2012; Percy 2005; Wals 2007)

When engaging in transformative learning, learners question their deeply held assumptions and are subsequently changed by the experience (Taylor and Cranton 2012). This change, or perspective transformation, can occur either through an accumulation of transformed cognitive meaning schemes or as a result of an acute personal or social crisis (Mezirow 1978). The first form corresponds to a psycho-developmental view of transformative learning occurring across the lifespan, reflecting incremental and progressive growth and continually leading to a more inclusive and discriminating worldview (Laros, Fuhr, and Taylor 2017). The second form refers to the consequences after a process of dealing with profound changes, such as a natural disaster or a sudden job loss. Transformative learning is rooted within an emancipatory approach to

education, with critical reflection as core process (Finnegan 2019; Mezirow 2007, 1990). According to the theory on transformative learning, it is only through critical reflection ‘that we can fully exploit the immanent potential of the knowledge and information at our disposal in an empowering and even emancipatory way’ (Finnegan 2019). Referring back to the arguments for more bottom-up learning activities, we want to scrutinise how an OFD can contribute to emancipatory and transformative learning. This theory stimulates us as researchers to understand better how offering a space in which other practices, ‘ways of doing things’, are demonstrated and discussed. This can induce disorienting dilemmas and cognitive conflicts as a potential starting point for transformative learning, and critical reflection, a crucial factor in this theory. In this understanding, there is also an appreciation for the role of relationships, personal contextual influences and holistic ways of knowing (E. W. Taylor 1998) which can be taken into account during OFDs. According to this theory, OFD practices can be one of the potential small steps leading to a more holistically and systemically informed worldview regarding farming practices. In this context, broadening of the worldview can occur when attendees are exposed to unfamiliar farming practices, through for example demonstrations or discussions, which they can understand as presenting an alternative or expansion to the practices they are already familiar with.

In this study, we build upon the following transformative learning concepts: the role of dialogue and the deliberate facilitation of it, disorienting dilemma, critical reflection, and the adoption decision process, understood as depicted in Figure 1. In the next sections, we provide more in-depth descriptions on how we understand these core factors within the context of learning at OFDs and how these translate into the questions we aim to answer in this research project.

The role of dialogue and facilitation

Engaging dialogue on an equal footing makes possible a process of assessing reasons behind competing interpretations (Mezirow 1978) and stimulates autonomous thinking and learning (Taylor and Cranton 2012). Transferred to the context of OFDs, it is important that facilitators encourage a type of dialogue in which equal participation among learners in a critical examination of evidence, arguments, and sharing of alternate

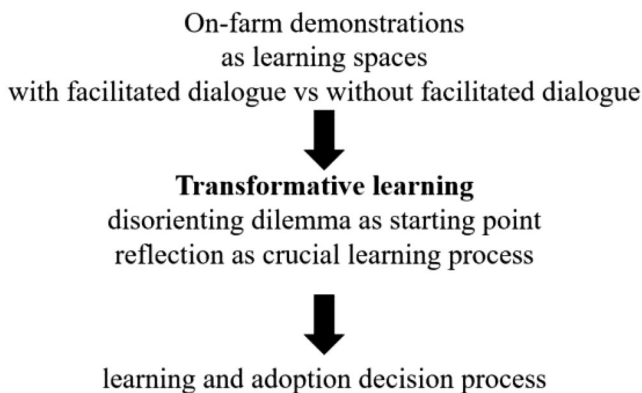


Figure 1. Conceptual framework.

points of view is facilitated. Additional strategies could include engaging participants in sharing their own background knowledge in small- and whole-group discussions. This stimulates participants to find their voice and feel respected in their role as adult learners (Taylor, Duveskog, and Friis-Hansen 2012). Facilitated dialogue reflects then an emancipatory, empowering approach (Finnegan 2019) to learning activities during OFDs. Our main research question aims to scrutinise if facilitated dialogue during an OFD positively influences core processes of transformative learning as experienced by participants.

Disorienting dilemma to induce a learning process

A disorienting dilemma triggers a questioning of assumptions (Laros, Fuhr, and Taylor 2017) and represents the initiation of a transformative learning experience. Originally it was understood as a sudden life crisis (Mezirow 1978), but other forms of catalysts have been defined by scholars throughout the further development of transformative learning theory. Nohl (2015) for example suggests that transformative learning can occur unnoticed, incidentally, and sometimes even casually, when a new practice is added to old habits.

In both cases, a state of disequilibrium concerning assumptions earlier taken for granted is seen in transformative learning theory as a catalyst for change. In our research, a proxy representing this catalyst is assumed in learners being confronted with information that does not coincide with their own previous knowledge and beliefs, through for example watching a demonstration of a new practice or listening to, and engaging in discussions with peers (Cooreman et al. 2018). Our hypothesis is that when learners are confronted with a feeling of surprise this could induce a disorienting dilemma, which consequently can lead to a cognitive conflict. Cognitive conflict is not only recognised in transformative learning but also in a broader constructivist view on learning (Kelly, Bennett, and Starasts 2017). In this view, cognitive conflict also stimulates learning through feeling the need to utter the contested point of view in language, stimulating learners to revise their reasoning through interaction with others. Kelly, Bennett, and Starasts (2017) already recognised that constructivist learning through dialogue and interaction ‘is a good fit for agricultural extension because it allows individuals to test out ideas in a community prior to practice’. As a first sub-question, we assess if facilitated dialogue during OFDs stimulates this experience of surprise, as a trigger for cognitive conflict.

The role of reflection in transformative learning

Critical reflection as defined by Mezirow (Laros, Fuhr, and Taylor 2017) is the conscious and explicit reassessment of the consequences and origins of our meaning structures. It is a process by which we attempt to justify our own beliefs. This is achieved by challenging its validity through, for example, sharing different viewpoints with others, and, arriving at a better-informed judgment.

According to Lankester (2013), the building of trust relations and a sense of belonging among peers is important as part of facilitating dialogue in which participants of an OFD come to processes of questioning their practices, self-identity, and cultural norms and values. Here, the facilitator is again crucial in creating this environment of trust, empathy, openness, and mutual respect (Percy 2005; Cristóvão et al. 2009). Thus, as a second sub-question, we investigate if OFDs with facilitated dialogue, and thus with a

wider variety and amount of views shared have more participants who stated having reflected on their own point of view and on their own practices compared to the other OFDs.

Adoption decision process and transformative learning

Finger and Asún (2001) and other sustainability learning proponents (e.g. Wals 2010) state there is still a need to develop a better understanding of how learning at the level of worldview is translated into action. Transformative learning supports people in developing better assumptions about the world, that will guide their actions more effectively (Moyer and Sinclair 2020). In that light, we are interested in the impact of an OFD on the adoption decision process of innovative practices by participants of the OFD. More specifically, as a third sub-question, we are interested in why participants changed or deliberately did not change (one aspect of) their farming practices in relation to the OFD, and as fourth and last sub-question, if facilitated dialogue supported this decision process.

Materials and methods

We built on data obtained in the Horizon 2020 research project, AgriDemo-F2F, which aimed at investigating how the effectiveness of OFDs can be improved. The partners of AgriDemo-F2F were provided with data gathering tools accompanied with user guidelines, based on the conceptual framework by Cooreman et al. (2018) and the analytical framework of the AgriDemo-F2F project (Koutsouris et al. 2017). The analysis is based on the data of 15 OFDs spread throughout Europe. The range of topics of the OFDs included for example high-tech dairy farming, arable farming, and agroforestry, assuring a high diversity as required by the research project. Further, we do not go into depth on the specific topics of the OFDs, since they all aim to contribute to agricultural knowledge and/or skills of participants. However, we recognise that the specific topic also has an impact on learning processes, which is further addressed in this issue in the work of Alexopoulos et al. (2021). For this research, subject of study is facilitated dialogue influencing learning processes, regardless of the specific topic.

Data gathering

Data about the occurrence of a feeling of surprise, reflection on own points of view, and the adoption decision process of represented agricultural practices was gathered using a mixed-method approach (Figure 2) and included: pre and post demonstration surveys, telephone interviews and observation tools.

Before each OFD, participants were asked to fill in a short survey that requested information on age and gender, motivation to attend and years of experience. Immediately following each OFD, participants were asked to complete a post demo survey designed to find out what types of learning they have experienced during the OFD (among which for example reflection processes, hands-on, interaction, and communication opportunities which support learning processes). For the sake of our interest in transformative learning, we will focus only on the questions asking about their feeling of surprise and reflection process. Both are seen as supportive indicators to induce, of course without

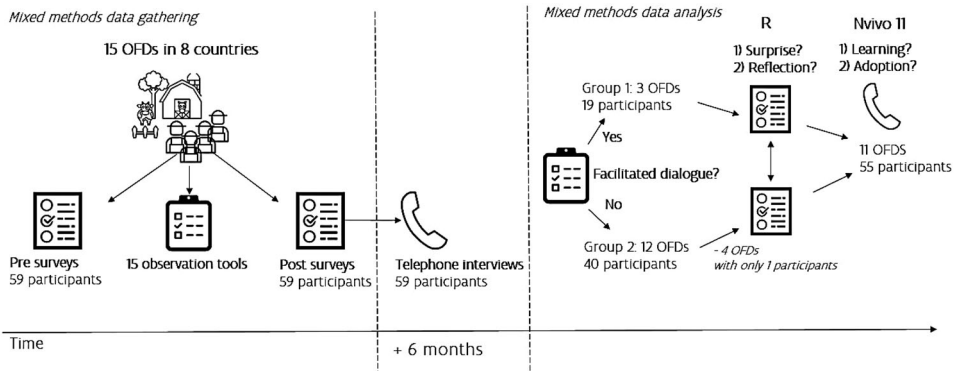


Figure 2. Mixed-methods approach.

guaranteeing, transformative learning processes. This survey consisted in total of four closed (yes/no) questions, 46 closed 4-point ordinal scale questions, with a 5th option to cross ‘not applicable’, and three open questions. The follow-up telephone interviews with survey participants occurred approximately six months after the OFD took place.

Furthermore, an observation tool was designed to capture data on characteristics of the OFD on the one hand, such as topic, group size, and facilitation approaches, and on the other hand, to determine which learning processes are stimulated by attending the OFD. For each OFD one or two researchers, who acted as observer during the OFD, collected data using this tool.

In this research, we decided to only include answers from OFD participants who (i) participated in an OFD correctly observed using the observation tool (next section), (ii) were farming at the time of the OFD, (iii) answered the post-survey and (iv) were within reach for us to contact through telephone interviews after the demo event took place. This resulted in 59 participants across 15 OFDs in 8 different countries included in this study (Table 1).

Data analysis

Observation tool

Data from the observation tool were used to divide the 15 OFDs into two groups. Table 1 shows the two groups, with group 1 existing of OFDs with strong facilitated dialogue and group 2 existing of OFDs with clearly less or no facilitated dialogue. Table 1 also details the two observation tool questions and related answers that were used to appoint an OFD to group 1 or 2. Combined answers c or d on ‘participants formulate their own points of view’* and ‘Open discussions are stimulated during the OFD’** qualified an OFD in group 1 (Table 1). This resulted in three OFDs being appointed to group 1, with answers of 19 participants. The 12 other OFDs were appointed to group 2, with answers of 40 participants.

Pre and post demo surveys

We compared the 2 OFD groups on two post demo survey 4-point ordinal scale questions, requiring participants to choose between a level of agree or disagree, but with the extra possibility to cross ‘not applicable’ (NA). The first question entails answers

Table 1. Answers on observation tool questions linked with facilitated dialogue of 15 OFDs.

Case	Total group size	Formulating point of view*	Open discussion**	'Facilitated dialogue' group	# participants
1	20	d	d	1	8
2	8	c	d	1	7
3	6	d	d	1	4
Total group 1	34				19
4	350	b	c	2	6
5	40	b	c	2	2
6	100	a	a	2	6
7	40	b	b	2	4
8	100	b	a	2	2
9	9	b	c	2	1
10	50	b	c	2	1
11	700	b	c	2	10
12	50	b	b	2	1
13	25	b	b	2	1
14	50	b	c	2	3
15	30	b	c	2	3
Total group 2	1544				40
Total group 1	1578				59
+ 2					

*(a) It felt like only the demonstrator was talking the whole time; (b) there were a few participants trying to formulate their own points of view regarding the topic; (c) there were a lot of participants formulating their points of view regarding the topic; (d) almost every participant formulated their own points of view regarding the topic.

** (def.: sharing of conflicting points of view, with respect for each other. Consists of more than one question and one answer) (a) No open discussions were held; (b) there was time for an open discussion, but nobody really engaged; (c) open discussions between a few participants were stimulated; (d) open discussions are stimulated and given a lot of time. Most participants are involved.

on 'I felt surprised at some point(s) during the demonstration', chosen as an indication of a process of disorienting dilemma. The second question represents reflection as a crucial factor in the transformative learning process: 'I reflected on my own point of view at some point during the demonstration.'

Statistical analysis was performed using the *ordinal* package (Greenwell et al. 2018) as implemented in the R software (R3.6.2; R Core Team 2019).

The 'not applicable' answers (one observation for both the surprised and reflection variable) were removed from the data so that the resulting response variable could be analysed as an ordered categorical variable using a cumulative logit model (Agresti 2010) with the following formula:

$$\text{logit}(\text{score}) = g(\alpha_j) + \beta_1 \times \text{group} + \mu_{\text{case}}$$

Each regression model comprised of a threshold model, $\theta = g(\alpha_j), \theta_j$ with θ denoting the thresholds, and $g(\alpha_j)$ a linear function with parameters α_j . Following the nature of the questions, a symmetric structure was specified for the threshold parameters so that only two parameters (α_j) had to be estimated, the central threshold, and a spacing between the response levels we determined (Christensen and Irlle 2019); and a group effect with the coefficient of β_1 representing the difference of group 2 (without facilitated dialogue) relative to group 1 (with facilitated dialogue). This group difference thus represents an estimation of the influence of characteristics that are different in the two groups on the two questions we investigate. To account for the effects related to the OFD caused by e.g. demonstrator effect (characteristics of the demonstrator influencing surprise and reflection), a mixed modelling framework was used treating the OFD effect as a random effect:

$\mu_{case} \sim N(0, \sigma_{case})$. To avoid confounding effects between the variance processes of the fixed and random effects models, OFDs with a single respondent (4 cases) were removed from the analysis. Likelihood Estimation, with Laplace approximation for the random effects, was used to fit the model (Table 2).

Follow-up telephone interviews

For the analysis of the qualitative data gathered through telephone interviews, we used NVivo 11. We categorised the answers on ‘What did you learn?’, following the question ‘Did you learn something because of the OFD?’, in order to gain more insight into reflection processes, using a deductive open thematic coding approach (Gibbs 2012).

Using the same approach, we categorised answers on the elaborating open questions on adoption as a possible outcome of a transformative learning process: ‘What exactly?’, ‘Why not?’ and ‘Can you think of a way the OFD could have been more interesting for you?’ We also investigated the answers to the question ‘Did the demonstration event result in you doing something new or differently (on your farm), or do you plan to change something?’ to get more grip on the adoption decision process. In our analysis, we divided this question in two, with the interviewer asking first if something new was adopted and subsequently if (further) change was planned. Since these two answers are usually intertwined in practice, we analysed the data on these two questions as one answer. Here, we only include cases in the analyses for which we have more than one telephone interviewee (11 out of 15), to avoid representing participants of an OFD by only one opinion, which might be an outlier.

Results

Facilitated dialogue as inducing surprise and reflection

Our statistical analysis shows that participants in the group of OFDs with facilitated dialogue had a significantly (at the 95% confidence level) higher chance of answering either agree or strongly agree on the questions related to surprise ($\beta_1 = -1.715$; s.e. = 0.589; p -value = 0.004) and reflection ($\beta_1 = -1.659$; s.e. = 0.620; p -value = 0.007), compared to participants in the group of OFDs with less facilitated dialogue. The predicted probabilities provide further insights into the response categories. For a surprise, almost all the probability mass of group 1 participants is in the category agree (0.500), followed by disagree (0.323), and strongly agree (0.128) (strongly disagree [0.049]). For group 2 participants, the highest probability mass is in the disagree group (0.545), while the probability mass in the agree (0.207) and strongly agree (0.026) categories are substantially lower, and

Table 2. Summary of the OFD survey data used in the analysis.

	Group 1	Group 2
No. of observations	19	36
No. of OFDs	3	8
Mean age	41.2 (21.5 ^a)	49.8 (12.4 ^a)
Gender (male/female)	95%(18)/5% (1)	86% (31)/14% (5)
Mean years of professional experience	23.5 (19.1 ^a)	23.6 (15.2 ^a)

^asd: standard deviation.

substantially higher in the strongly disagree (0.222) category, compared to group 1 (Figure 3).

For reflection, we found the same trend with almost all the probability mass of group 1 in the categories agree (0.689) and strongly agree (0.155), while for group 2 participants, there is also a remarkable probability mass in the disagree group (0.491) and the strongly agree probability mass is substantially lower (0.034) compared to group 1.

These findings support the inducing role of facilitated dialogue for surprise and reflection. In relation to this, out of a pool of 15 OFDs observed for AgriDemo-F2F, only 3 OFDs are considered as facilitating dialogue, which points to the importance of further room for improvement. Even though transformative learning theory consists of more stages (Mezirow 1978; Taylor and Cranton, 2012; Nohl 2015) and the theoretical concepts disorienting dilemma and critical reflection are more complex than what is measured in our study, this initial outcome indicates the relevance of studying OFDs as a supportive step in transformative learning processes of farmers.

Facilitated dialogue as enhancing learning and informed decision-making in the adoption process

Based on data from telephone interviews, we analysed answers on questions regarding ‘If they learned something’; ‘If so, what was learned’; ‘If practices were changed or adopted’; and ‘Why or why not (regarding adoption)’. We found answers ranging from simple techniques (e.g. ‘new methods in weed control’) to reflective thinking (e.g. ‘makes you think and makes you look at what others are doing to maybe build on that’). Furthermore, 89% of participants in group 1 and 71% of group 2 stated in the telephone interviews that they learned as a result of the OFD, while on the other hand, only 26% of group 1 and 46% of group 2 answered positively on (planning on) adoption. This result stresses that participants stating having learned are not more likely to (plan to) adopt a demonstrated practice. Learning during OFDs can for example also inform the decision process not to adopt a certain innovation because it does not fit with the participant’s farming

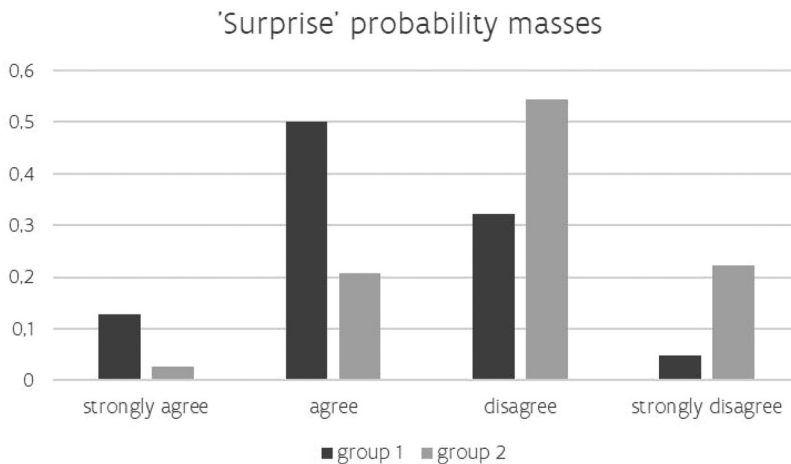


Figure 3. ‘Surprise’ probability masses: group 1 compared to group 2.

system, which also counts as a valuable reflection. Apart from knowledge exchange facilitation methods used during an OFD, the adoption decision process of farmers to implement a certain (innovative) practice is undeniably influenced by different conditions that can be related to what is also considered as crucial in transformative learning. To gain more insight into these conditions, we categorised the answers on ‘Why did you not adopt?’ An analysis of the answers given more than once is summarised in [Table 3](#).

Next, answers on ‘What could have made the OFD more interesting for you?’ revealed five relevant conditions (which were mentioned more than once) and are presented in [Table 4](#).

Based on [Table 3](#), we conclude that most reasons for not adopting are the doubted relevance of the OFD for the farmers’ specific situation, a need for more information, more time to reflect before making a decision, costs (which relates to ‘relevance’) and the state of (under)development of the demonstrated innovation. Suggestions mentioned by participants for improvement of the OFD ([Table 4](#)) are notably similar: ‘increase in real life context application’ also relates to a need for more ratification of the relevance for the own situation.

Discussion

Our results demonstrate the relevance of studying OFDs as a supportive step in transformative learning processes. The quantitative findings suggest that the potential of OFDs in stimulating transformative learning through surprise and reflection increases when

Table 3. Conditions found in answers on ‘Why did you not adopt?’.

Conditions influencing the decision of adoption (number of answers)	Relation to transformative learning	Examples of answers on the Q ‘Why did you not adopt?’
Relevance for the specific situation (14)	‘Immediate relevance’ is a principle for adult learning (e.g. Knowles 1980) and definitely for more impactful transformative learning processes (e.g. Illeris 2017)	‘no reason to change’ (6) ‘already changed before event’ (4) ‘retiring soon’ (2) ‘because of ammonia, my farm is not allowed to expand, so I don’t know what to do or where to go with my questions’
Costs (4)	Understood as a subcategory of ‘Relevance for the specific situation’	‘I learned that it’s not profitable for me to rear young cattle’ ‘too costly’ (3)
More information necessary (11)	The need for enough evidence, trusted points of view, and confirmation to support the process of reflection, validation, and transformation of the own perspective (in a certain direction) (e.g. Laros, Fuhr, and Taylor 2017; Mezirow 2012)	‘need to see more similar things’ ‘didn’t learn anything new’ ‘visit was not very qualitative’ ‘need to get more info first’ (7)
Time to reflect (7)	Transformative learning requires time. (Merriam 2004; Laros, Fuhr, and Taylor 2017)	‘need to think more about the idea’ ‘only just started’ ‘not yet a direct choice for innovation’
Newness or riskiness of the innovation (4)	Reflection challenging the validity of the current practices happened here to some extent, arriving at the best-informed judgment, which resulted here in ‘keeping things as they are’. Our identity defence system also protects us against ‘too much’ transformative learning, which could result in some kind of confusion or instability (Illeris 2017)	‘was too big of a risk’ ‘technique not developed enough yet’ ‘method not applicable yet for small farm’

Table 4. Conditions found in answers on 'What could have made the OFD more interesting?'

Mentioned lacking conditions of OFD (number of answers)	Relation to transformative learning	Exemplary answers on 'What could have made the OFD more interesting?'
Increase in real-life context application (10)	The more knowledge can be presented in an embedded way, and the richer the learning space, the better. What is put into practice in an authentic way will link easier with realistic problems that participants are facing and their prior knowledge, stressing the relevancy. This is a learning principle which is recognised in many educational theories, among which transformative learning (Taylor, Duveskog, and Friis-Hansen 2012; Illeris 2017)	'practical demonstration on how sensors work in commercial farm' 'staying closer to real life commercial farming practice' 'more contact with the animals' 'see the machines working on other crops' 'presentations more outside in the field when possible'
More in-depth information (8)	The need for enough evidence, trusted points of view and confirmation to support the process of reflection, validation, and transformation of the own perspective (in a certain direction) (e.g. Illeris 2017; Laros, Fuhr, and Taylor 2017)	'info on world market prices' 'info about the yield of the nut trees and the combination with meadows was lacking' 'demonstrators should have been more informed'
'More and other topics' (4) (which could translate to 'More OFDs')	See 'More in-depth-information' and this additionally reflects a need for expanding on knowledge in a holistic way about farming systems (Wals 2015; E. W. Taylor 1998).	'topics like usage of fertilisation, mechanical weed control, trace element fertilisation, agriculture 4.0' 'more topics'
Providing hands-on-experience (4)	Research substantiates the relationship between action and perspective transformation (Lange 2004). Without experiences to test and explore new perspectives and continual practice, it is unlikely for learners to transform (Laros, Fuhr, and Taylor 2017)	'Hand-on experience for participants' 'More practical work and hands on experience'
More time to talk with colleagues (3)	Transformative learning does not happen in vacuum based on the insights of an autonomous learner, instead it is socially influenced, shaped, and accountable to others (Mezirow 1978, 2012; Laros, Fuhr, and Taylor 2017; Nohl 2009)	'couldn't ask questions to the farmer' 'would have liked more time to talk with colleagues'

facilitated dialogue is incorporated. In contemporary European OFDs, facilitating dialogue is not a common practice, an assumption we make since less than half of the OFDs incorporated facilitated dialogue according to our definition (3 out of 15, Table 1).

Although more participants in the facilitated dialogue group (1) stated having learned as a result of the OFD (89% of group 1 and 71% of group 2), more participants in the other group (2) confirmed (planning on) adoption (46% of group 2 and 26% of group 1). This stresses that learning is not necessarily followed by immediate adoption and adoption is not necessarily the result of learning during the OFD. Learning during OFDs can also inform the decision process not to adopt because the presented content does not fit the particular farming system. This learning through reflection on possibilities is valuable from a transformative learning point of view. Although it might not immediately stimulate adoption, it might lead to the best-informed adoption decision in the long term. Stimulating a greater sense of empowerment or a sense of responsibility is often understood as an outcome of transformative learning (Hoggan 2016), and is also a crucial competency when learning for sustainable development (Wals 2015). From an emancipatory point of view, education during an OFD should not be used to prescribe certain

behaviours or values, but rather stimulate meaningful engagement and empower farmers to make deliberate choices (Wals 2015). This approach is also preferred when aiming to achieve sustainability goals through learning, compared to legislation and other prescriptive and more authoritarian approaches (Blackmore 2007; Moyer and Sinclair 2020; Wals 2015). To be able to make deliberate choices, farmers need to be confronted with a more holistic understanding of what the different possibilities are for their own farming practice. One of the ways to trigger this kind of understanding is through a facilitated dialogue where the many aspects of a farming practice but also different perspectives and experiences are pointed out and discussed freely among the participants of an OFD. Previous research related to Communities of Practice and other kinds of collaborative learning groups related to agriculture already pointed to the successfulness of sharing of ideas, experiences, and practices in a democratic way (Cristóvão et al. 2009). Through incorporating facilitated dialogue, OFDs could offer a (more) democratic space that induces cognitive conflict and contributes to transformative learning processes.

Naturally, other life events and conditions apart from facilitated dialogue during an OFD could have had an impact on the adoption decision process. Regarding reasons for not adopting and suggestions mentioned by participants for improvement of the OFD, a need for more correspondence of what was demonstrated with their own farming system was put forward by the participants. ‘Immediate relevance’ is a determining factor for learning, known in adult and transformative learning theory (Illeris 2017; Knowles 1980). We acknowledge that it is nearly impossible to tailor an OFD to every participant’s specific situation, and those who might benefit most, might not even attend due to different reasons. However, as a possible way – to address the often mentioned complaint about a mismatch between the demonstrated innovation and the own situation, facilitated dialogue could be used as a way to stimulate discussions on demonstrated innovations. Examples are discussions on machinery, sustainable and manageable ways of disease control, profitable and sustainable combinations of different crops and animals. Important to stimulate more holistic worldviews in these discussions is the attention for the impact of innovative practices on the complete farming system, and not only on the isolated practice. In addition, farmers could be consulted in a discussion on the choice of focus of future OFDs. Showing application in (more) real-life situations where possible or ‘providing hands-on-experiences’ can stimulate this kind of discussion among participants and enhance opportunities to relate and connect with others, the OFD environment and other species, fostering learning for sustainable development (Wals 2015).

The suggestions to provide more information, also on more and other topics, correspond with ‘a need for more information’, as a reason for not adopting. Expanding on sharing knowledge about farming systems in a more holistic way could support attendees’ knowledge integration processes as a competency for sustainable development (Wals 2015). As another answer to ‘a need for more information’ and allowing time to reflect, somehow providing follow-up and guidance after the OFD could be beneficial for transformative learning (E. W. Taylor 1998). Adding to the latter, and as a response to the suggestion ‘more time to talk with colleagues’, we suggest more (time for) dialogue during OFDs. This is based on the consideration that transformative learning is socially influenced, shaped by trusted points of view, and accountable to others (e.g. Laros, Fuhr, and Taylor 2017; Nohl 2009).

We identify OFDs in this research as potentially rich learning spaces for discovering and discussing farming practices together with other experts. Future policies (EU SCAR AKIS 2019) could aim at training skills of OFD demonstrators and facilitators on how to facilitate dialogue during OFDs, enhancing participants' comparison, cognitive conflict and reflection opportunities, which are crucial steps before deciding on adopting a certain farming practice or not. This request for training of demonstrators and facilitators in applying interactive learning methods is in line with previous research (Crawford et al. 2007), stating that professional development in extension is required for advisors to successfully guide reflective learning processes. The beneficial aspects of facilitation during agricultural demonstrations are further integrated and utilised in other European projects such as the NEFERTITI project. This project aims at establishing an EU-wide highly connected network of demonstration and pilot farms designed to enhance knowledge exchanges. More specifically, its' objectives include fostering the learning process of all actors involved in demo-activities to identify best practices for demonstrations. This project builds on findings from the H2020 AgriDemo-F2F and PLAID project. Both projects focused on farmer-to-farmer learning during European agricultural demonstrations and the creation of on-line guiding resources, including an inventory of demonstration activities in Europe. The results of these linked projects strongly support the crucial role of a skilled facilitator (Adamson-Fiskovica et al. 2021; Marchand et al. 2021) and therefore adds to the appreciation of the contributions facilitators and other related types of network brokers can make within the AKIS (Klerkx and Leeuwis 2009).

We also want to emphasise some limitations of this study. First, for a few cases, only a small proportion of participants completed our survey. This was due to the decision of many participants not to fill in the surveys, our own decision to include only participants who were also interviewed by telephone six months after the OFD, and other timing and practical reasons. Second, we only focused on the interplay between facilitated dialogue and surprise and reflection as core factors derived from transformative learning theory, which does not cover its complete complexity. In addition, a learning space is an environment for which it is impossible to grasp every influencing condition. As found in our study, the relevance of the OFD for the specific situation of the farmer, the need for even more information than could be provided during the OFD, more time to reflect, costs and the newness or riskiness of the innovation, could as well be strong determinants of the impact of an OFD. As an example of an influencing factor we did not cover, learning during OFDs will be affected by the cultural context, such as degree of comfort with taking part in dialogue during the OFD (Moyer and Sinclair 2020).

Future research could aim at evaluating OFDs designed as a learning space deliberately incorporating core factors fostering transformative learning (e.g. including individual hands-on experiences, fostering disorienting dilemma, critical reflection and [facilitated] dialogue) (Taylor, Duveskog, and Friis-Hansen 2012). Our research also points at the importance of scrutinising what conditions support deliberate reflection processes on the demonstrated practice. But as our research has shown, it is impossible nor desirable to impose transformative learning (Illeris 2017). Facilitated dialogue is most powerful in this context when it can help in trying to detect why participants of an OFD are actually prepared (or not) to change perspectives about certain practices, where these interests come from and how they can be addressed (Illeris 2017).

Conclusion

OFDs are important learning spaces that can foster transformative learning processes with the use of facilitated dialogue, among other methods. But as our analysis indicates, more efforts could be put into ensuring that the OFD is relevant to the situation of the attendees, and into application in real-life contexts and incorporation of hands-on experiencing by attendees. Incorporating facilitated dialogue in knowledge exchange methods during OFDs reflects our core suggestion for improvement of OFDs, since it stimulates transformative learning as well as competencies for sustainable development. More specifically, OFDs with facilitated dialogue can trigger more cognitive conflict and reflection processes, through the sharing of multiple perspectives by different attendees, as opposed to OFDs without deliberate facilitation of dialogue.

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Data availability statement

The data that support the findings of this study are available on request from the corresponding author, H. C. The data are not publicly available because the data sets contain information that could compromise the privacy of research participants.

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Appendix A. Example observation tool

Formulating own points of view

- (a) It felt like only the demonstrator was talking the whole time.
- (b) There were a few participants trying to formulate their own points of view regarding the topic.
- (c) There were many participants formulating their points of view regarding the topic.
- (d) Almost every participant formulated their own points of view regarding the topic.
- (e) N/A

Illustrate.

Fosters open discussions (def.: sharing of conflicting points of view, with respect for each other. Consists of more than one question and one answer.)

- (a) **No** open discussions were held.
- (b) There was time for an open discussion, but **nobody really engaged**.
- (c) Open discussions between **a few participants** were stimulated.
- (d) Open discussions are stimulated and given **a lot of time. Most participants** are involved.
- (e) N/A

Percentage of the time? Give an example.