

# Conceptualising a dynamic technology practice in education using Argyris and Schön's Theory of Action

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**Abstract.** Despite substantial national effort to integrate technology in education, it seems that practitioners in the education system are not working in line with the given policy. Evidence from large-scale studies of students' technology practices at school over the last decade show disparities in student practices. The observed gap between the micro and the macro level call for a closer exploration. Research that explores the influence of social and organizational factors may be useful for understanding the processes behind such gaps. Argyris and Schön's 'Theory of Action' (1978) is proposed as an example of an organizational theory that can be adopted in educational technology research to move towards understanding the complexities of technology practice. To encourage discourse and application of Argyris and Schön's theory in the field of educational technology research, this paper introduces the theory, a review of its empirical application in research of teacher educations' technology practice and relevant conceptual work. The paper presents a conceptual framework based on Argyris and Schön's theory that has been developed through two recent studies, and invites its application in future research and development.

**Keywords:** Theory of Action, Digital School, Teacher Education, Digital Attitude, Digital Literacy.

## 1 Introduction

Much work in education is focused on the role of technology to foster skills and competencies that prepare students for their digital futures. Several international studies show that teachers integrate technology insufficiently in their educational practices [24, 29, 30]. ICT has not changed education as much as anticipated by policy-makers. Yet, a growing body of research details disparities in primary and secondary school students' technology practices, skills and knowledge associated with a range of social and cultural factors [18]. Evidence from large-scale studies of developed nations over the last 10 years shows that such disparities have remained more or less constant. Despite an extensive body of educational technology research, there is limited research that provides a detailed understanding of students and teachers' technology practice in the educational context. Much of the empirical research to date has focused on the long-last-

ing introduction of new technology in schools and society, and the effects of these various technological artefacts on learning. This work provides important evidence of the effectiveness of using specific technologies to support specific learning processes and outcomes. However, what is missing is a broader understanding of technology practice in education [5, 21]. Research that conceptualises digital technologies as social tools, surrounding the artefact, its use and its context, will help provide an understanding of the interrelations between technology practice, teachers and students. An increasing body of research proposes that a theoretically founded definition of technology and practice may offer a means to extend research agendas beyond effects of technology and the immediate practical consequences [21, 26]. Research in the field of educational technology would benefit from an organizational framing that pays attention to the understandings and attitudes of learners and considers the social and cultural milieu of technology practice [7, 27]. This has motivated calls for a more critical approach to the investigation of technologies for learning that extends beyond short-term advance [26, 27]. The inclusion of these types of studies within the literature can address questions of how individual, physical, social and cultural structures interrelate to shape technology practice.

## 2 Argyris and Schön's Theory of Action

Their theoretical constructs serve as theoretical and methodological tools for systematic analysis of learning organizations at the meso-level (between macro and micro). Theory of action is a theoretical framework offering an analytical distinction between an individual or an organisations' espoused theory and their theory in use. This theory is based on the notion that "humans have programs in their heads on how to act effectively in any type of situation" [2]. These programs is understood as maps or theories of how we understand the world. Argyris [1] claims that it is impossible to reason anew in every situation, and explains: «If we had to think through all the possible responses everytime someone asked, "how are you?" the world would pass us by".

Therefore, everyone develops a theory of action: "a set of rules that individuals use to design and implement their own behaviour as well as understand the behaviour of others" [1]. The theory of action consists of two different types of theories, «there are important differences between the meanings created when people espouse their views and when they act them out" [1]. Argyris og Schön [3] defines this distinction as the theory in use and the espoused theory. The theory in use is guiding our actions, while the espused theory is our explanations of why and how we are acting.

### 2.1 Theory in use

Insight in peoples theory in use is gained when you observe people's behaviour and try to establish what rules that would make sense of the action. Peoples primary theory in use is refered to as "model 1". This strategy tends to have the purpose "to control unilaterally the relevant environment and tasks and to protect oneself and others unilaterally" [1]. Other underlying strategies are "unilateral control over others. Characteristic

ways of implementing this strategy include making unillustrated attributions and evaluations, advocating in ways that discourage inquiry, treating one's own views as obviously correct, making covert attributions and evaluations, and face-saving" [1]. The consequences of these Model 1 strategies are likely to be defensiveness, misunderstanding, and self-fulfilling and self-sealing processes [1]. «Defensive reasoning encourage individuals to keep private the premises, inferences, and conclusions that shape their behaviour and to avoid testing them in a truly independent, objective fashion" [2]. Such theories in use are learnt early on in life and therefore the actions that they produce are highly skilled. Little conscious attention is needed to produce highly skilled action [1]. Contrary to model 1, Theory in use "model 2" needs conscious attention. These theory in use is applied when the governing values are valid information, informed choice, and vigilant monitoring of the implementation of the choice in order to detect and correct error. Model 2 theories are, at the outset, espoused theories. The challenge is according to Argyris [2] "to help individuals transform their espoused theories into theories-in-use by learning a "new" set of values and skills".

## **2.2 Espoused theory**

An individual's espoused theory is expressed when a person is asked to articulate which rules are governing the person's action. In other words, the theory "which is advanced to explain or justify a given pattern of activity" [4]. Espoused theory is based on the "principles and precepts that fit our intellectual backgrounds and commitments. But most of us have quite a different theory-in-use to which we resort in moments of stress" [2].

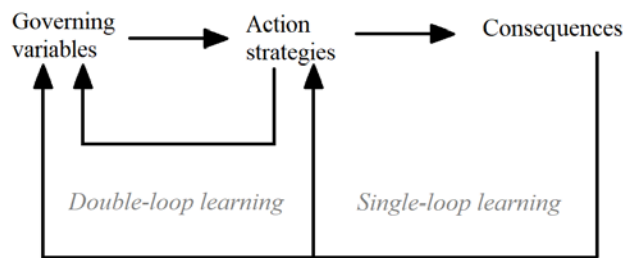
## **2.3 The paradoxical relationship between theory in use and espoused theory**

Individuals create meaning and purpose by observing and describing the world in certain ways. But what we espouse and what we do are not always aligned. A paradox in human behaviour is that the theories that are guiding our behaviour rarely are the theories we think we are guided by. This happens both consciously and more subconsciously, and asking critical questions regarding the discrepancy between one's espoused theory and theory in use can be challenging. «Human beings are said to be programmed to act automatically and tacitly in ways that are counterproductive to their espoused theories" [1]. "Put simply, people consistently act inconsistently, unaware of the contradiction between their espoused theory and their theory-in-use, between the way they think they are acting and the way they really act" [1]. Individuals' theory in use is to a great degree similar across gender, age and cultures, while an individual's espoused theory can vary from individual to individual [2].

## **2.4 Single-loop and double-loop learning**

In Argyris and Schön's learning theory the link between learning, change and resistance to change is central. It outlines two levels of learning: single-loop learning and double-loop learning (see Fig. 1). Single-loop learning is instrumental learning [4]. It involves

following routines and pre-set plans. This is both less risky for the individual and the organisation. Single-loop learning seems to be present when goals, values, frameworks and strategies are taken for granted, with only minor updates [28]. In single-loop learning processes the emphasis is on techniques and to make such more efficient. This level of learning changes strategies of action or assumptions underlying strategies in ways that leave the values of a theory of actions unchanged. Reflections are directed towards making the existing strategy more effective [4]. Double-loop learning, in contrast, are more creative and reflexive. It involves the consideration of notions about what is good. This form of learning results in a change in the values of theory in use, as well as in strategies and assumptions [4]. In double-loop learning processes (1) the basic assumptions behind ideas or policies are challenged and confronted, (2) hypotheses are publicly tested and (3) processes are challenging, not self-seeking and have organisational goals. Double-loop learning involves questioning the role of the framing and learning systems that underlie actual goals and strategies [1, 3, 4].



**Fig. 1.** Single-loop and double-loop learning [2]

### 3 Argyris and Schön's theory in educational research

The application of Argyris and Schön's theory offers educational research a tool to recognize the differing experiences that contribute to learning.

The studies we included met the following criteria:

1. Published in a peer-reviewed journal.
2. Present empirical research or review. This criterion was applied to ensure claims made in the studies were supported by data and thus exclude pure theoretical work.
3. Examines educational practice or contexts for learning. Argyris and Schön's theory is particularly useful in understanding the structures and relations that shape practice across diverse backgrounds and contexts.
4. Used Argyris and Schön's constructs to conceptualise theory in use and espoused theory (not applicable for review articles).

**Table 1.** Articles included in the review.

Article:	1	2	3	4
Madsen, Thorvaldsen, Archard [15].	Yes	Survey including 108 teacher educators.	Yes	Yes
Madsen, Thorvaldsen, Archard [16].	Yes	Survey including 108 teacher educators, and in-depth interviews with 20 teacher educators.	Yes	Yes
Thorvaldsen, Madsen [28].	Yes	Survey including 67 teacher educators and 48 teacher students.	Yes	Yes
Bulkley, McCotter [6].	Yes	Case study involving 3 prospective elementary and middle school leaders. Data collection for this study included a combination of interviews, observations, and document analysis.	Yes	Yes
Sandvold [25].	Yes	Data from observing two seminar groups and from interviewing teachers and students. Using Argyris' theories of action as a theoretical framework, the study explores the relationship between realities of practice and espoused theories	Yes	Yes
Perger [22].	Yes	Test results, survey and observation of three underachieving students.	Yes	Yes
Loizou [12].	Yes	Semi-structured interviews with a cross section of 18 Cypriot primary school teachers.	Yes	Yes
Mellati, Fatemi, Motallebzadeh [17].	Yes	The study investigates the relationship between Iranian English Language Teaching instructors' beliefs about language teaching and their real practices in classrooms. To collect data questionnaires and semi-structured interviews were employed.	Yes	Yes
Kerr [10].	Yes	Comparative analysis of conceptions and tools of practice of information literacy in 11 academic libraries in the US.	Yes	Yes
Leonard [11].	Yes	Analysis of 33 mentor teachers' professional experience reports.	Yes	Yes
Houchens, Hurt, Stobaugh, Keedy [9].	Yes	A qualitative case study that examines the extent to which a coaching protocol based on theories of practice enhanced principals' self-perceived capacity for reflection and effective instructional leadership.	Yes	Yes
Robey, Boudreau, Rose [23].	Yes	This paper reviews and assesses research literature on information technology and organizational learning.	Yes	N/A
Estes [8].	Yes	A questionnaire completed by 76 participants and 44 staff in adult standard courses held at the North Carolina and Colorado Outward Bound schools.	Yes	Yes

The searches were conducted in ERIC - Education Resources Information Center and ISI Web of Science. In ERIC the search was "Argyris", with the filter "peer reviewed only". This resulted in 65 articles. Descriptors also used when searching was (1) Theory Practice Relationship and (2) Educational practices.

The ISI Web of Science search was made by using the topic “Argyris”, and refining the search by the Web of Science categories: (1) education educational research, (2) computer science interdisciplinary applications or (3) education scientific disciplines. This resulted in additional 35 articles. A selection of relevant articles based on the presented four criteria for this review, is listed below.

## **4 Conceptualising processes towards technology practice using Argyris and Schön’s theory**

Drawing on review of the above empirical studies and relevant conceptual work, the following conceptualization of development of technology practices in educational settings was developed and refined through a PhD [14]: A questionnaire based on Argyris and Schön’s theory involves three main constructs: Professional Digital Competence, Professional Attitude and Professional Applications of Tools. To gain insight into the respondents’ theories in use, the questionnaire contains questions regarding the extent of use of different digital technologies. Professional digital competence is operationalised by using definitions by Tømte and Olsen [31] and Lund, Furberg, Bakken and Englién [13]. In accordance with the definition, three defined aspects of digital competence is structuring the statements in the questionnaire: pedagogic and didactic understanding, subject-specific understanding and technological understanding. This definition of digital competence is generally in agreement with recent literature, regarding its categorical understanding of digital competence. To illuminate attitudes (espoused theories), statements were prepared based on the OECD report ‘Connected Minds: Technology and Today’s Learners’ [19] and its description of the field’s existing attitudes towards technology. In the report, the field is described as characterized by stretching from being technology averse to technology positive. Statements are prepared to identify the respondents’ own motivations for using digital tools, the respondents’ attitudes towards digital tools’ position in the public arena and attitudes towards the use of digital tools in educational settings. Some items had a reversed scale, denoted by REV. The constructs were each based on questionnaire items, as follows:

### **4.1 Professional Digital Competence (PDC)**

- I am familiar with digital tools that can help diversify teaching.
- I am, in general, confident when using digital tools.
- I find it easy to become familiar with new digital tools.
- I can use digital tools that are appropriate for the aspects of the subjects I am teaching.
- It is difficult to use digital tools as an educational resource within my subject. REV.
- When I am using digital tools it is difficult to adjust the content to the individual students’ needs. REV.
- I have no clear idea of learning outcome when using digital tools in my teaching. REV.
- I use digital tools when giving feedback to students.

#### 4.2 Professional Attitude

- When I use digital tools in my teaching, I find it adds value.
- The use of digital tools is essential for good teaching.
- Society's expectations for the impact of digital tools are exaggerated. REV.
- Expectations related to the use of digital tools in education frustrate me. REV.
- In professional debates at our organization, the expectations of the impact of digital tools are exaggerated. REV.
- The use of digital tools is disruptive for the relationship between student and teacher. REV.
- Digital tools can make the students more interested in the subject I am teaching.
- I like testing new digital tools in my teaching.

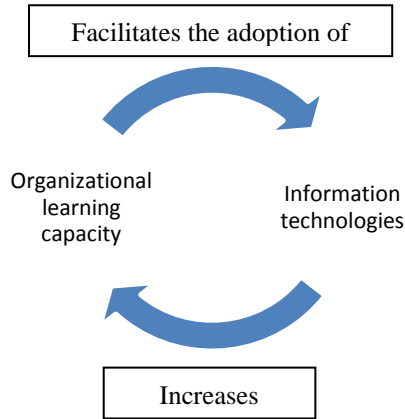
#### 4.3 Professional Application of Tools

- Digital tools for testing with multiple choice questions
- Moodle or Fronter (each university's learning management system)
- Digital tools for presentation (like PowerPoint or Prezi)
- Word processor
- Spreadsheets (like Excel)
- Use of video
- Production of film/video/animation
- Online discussions
- Online meetings (like Lync, Adobe Connect or Skype)
- Production of Wiki (website that allows collaborative modification)
- Screen capture (like Camtasia or Mediasite)
- Programs for scientific analyses
- Student response systems (online questions answered by phone or computers, like Kahoot! or Socrative)
- Tools for collaborative writing (like Google Docs)
- Social media (like Facebook or Twitter)
- The Internet as a source of knowledge

Argyris and Schön's theory were born out of empirical research, and thus were intended to be methodological tools with which to study social and organizational phenomena.

Robey et. al. [23] writes that one emerging stream of empirical work uses organizational learning to understand the implementation and use of information technology in organizations. They claim that driving this inquiry is the realization that information technology frequently yields disappointing results, as low payoffs, financial losses, dissatisfied users, and no increase in organizational effectiveness. Robey et. al. [23] further explains that a second emerging stream of research on information technology and organizational learning seeks to guide the application of technologies that support organizational learning. It is clearly valuable to examine both the consequences of learning and the processes that produce those consequences, and definitions of organisational

learning tend to emphasize either one or the other. The reciprocal relationship between the two research streams illustrated in Fig. 2.



**Fig. 2.** Relationship between the two research streams [23].

Our survey is focusing on the implementation and use of digital technology. One should also investigate how this method can be further developed to better utilize the connection between the two theoretical streams described by Robey et. al. [23].

## 5 Conclusion

In this paper, we have reviewed the empirical research of 13 studies using Argyris and Schön's Theory of Action to investigate educational practice. These studies have contributed to the field of educational research by highlighting how Argyris' theoretical framework can be used to study theory in use and espoused theory to understand practices. The questionnaire developed with a focus on digital technology in education builds on the notion that technologies are organizational tools, and that practices are complex and influenced by a broad range of social and cultural factors. The issues raised in these paper present challenges for educational technology researchers in understanding the complex landscape and adopting a process based methodology. The application of Argyris and Schön's constructs offers a fresh approach to investigating technology practice within educational design and development by providing a joint conceptual methodology.



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