Digital Citizen Participation within Schools in the United Kingdom and Indonesia: An Actor–Network Theory (ANT) Perspective

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Abstract: Citizen engagement and participation are a key focus for government and government agencies, and with the advent of Internet technologies questions arise about the role and impact of technology on citizen participation. This paper aims to explore the role of technology in citizen participation within schools. This research used in-depth comparative case studies using examples from two different schools and school systems, one in the United Kingdom and one in Indonesia. The wider school systems are complex and dynamic environments with multiple stakeholders, media, and supporting systems, and the schools operate under geopolitical and social influences. This paper provides a framework, based on Actor-Network Theory (ANT), for capturing e-participation in schools, particularly identifying the influence of technology as a conduit for enabling, engaging, and empowering stakeholders.

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1. Introduction

This introductory section briefly places the research in a broader context and provides the definition and importance of digital participation, especially in the education arena. It then goes on to cover the gap, aims, contribution, and main conclusions of the research. Digital citizen participation can be defined as citizen involvement in a particular activity using digital technologies. Citizen participation is important in making the activity of various fields of government successful. For instance, Oakley [1] argues that higher participation is needed to increase project efficiency and effectiveness, self-reliance among the participants, and the number of people who potentially can benefit from development. In politics, Alesina and La Ferrara [2] points out that political participation have significant impacts on policy-making and economic activities. Since the Internet age, there have been changes in participation channels and processes, using various electronic media for communication and interaction. This is the realm of "digital participation", where government interacts with citizens through the Internet and other ICT [3–10]. Recently, citizen participation is not only through physical and face-to-face activities, but also digital technologies, such as Twitter, Facebook, WhatsApp, e-mail, websites, and mobile applications. The UN defines electronic participation as follows [11]:

"E-Participation is about fostering civic engagement and open, participatory governance through Information and Communications Technologies (ICTs). Growing evidence points to the rapid expansion of e-Participation as a tool for engagement and strengthened collaboration between governments and citizens. Its objective is to improve access to information and public services as well as to promote participation in policy-making, both for the empowerment of individual citizens and the benefit of society as a whole."

A body of research is developing that tries to capture participation processes and activity within the electronic environment. For instance, Macintosh [3] developed a framework representing e-participation in policy-making; Tambouris, Liotas, Kaliviotis and Tarabanis [4] produced a framework for scoping e-participation; Saebo, Rose and Flak [12] produced the shape of the e-participation field; Kalampokis, Tambouris and Tarabanis [5] developed a domain model of e-participation; Islam [6] captured an e-participation implementation model; Phang and Kankanhalli [7] produced a framework of ICT exploitation for e-participation initiatives; hands-on guidelines for e-participation initiatives were studied by Scherer, Wimmer and Ventzke [8]; a reference framework for e-participation projects was explored by Scherer and Wimmer [9]; Bin Salamat and Bin Hasan [10] examined public policy formulation in Malaysia and developed a further e-participation framework using an actor-network theory (ANT) approach; McGrath, Elbanna, Hercheui, Panagiotopoulos and Saad [13] explored the role of online social media in supporting citizen participation in democratic debates and policy making; and Medaglia [14] revisited the Saebo et al. work and updated the model. Also, Nam [15] examines government-driven participation and collective intelligence using the case of the Government 3.0 initiative in Korea. Table 1 describes the existing frameworks of e-participation [7].

Table 1. Evaluation of previous e-participation frameworks [16] with updates.

Framework	Author(s) (Year)	Methodology	Covered	Not Covered
Levels of Participation	Macintosh (2004)	Case studies in Europe	Stages of Participation	- Lack of deep elaboration about critical factors of Participation - Lack of Education factor - Lack of Participation stakeholders - Lack of explanation about philosophical foundation of participation levels - Lack of Web 2.0 channel - Lack of test out the framework into outside Europe (Methodology)
Framework for scoping E-Participation	Tambouris et al. (2007)	Desk Research	Process from Democratic Processes, Participation Areas, Participation Techniques, Categories of Tools and Technologies	- Lack of Stakeholders in each stage - Lack of Technology channel - Methodology not clear stated - Lack of Empirical research to test out the framework (Methodology)
The shape of the E-Participation field	Saebo et al. (2007)	Literature reviews	• E-Participation actors, • E-Participation activities, • E-Participation effects • E-Participation evaluation • Contextual factors • Researched with theories and research methods	- Lack of complex factors - Lack of change factors - Lack of empirical research in various fields
A Domain model of E-Participation	Kalampokis et al. (2008)	Desk Research	E-Participation domain and details of sub-domain	- Lack of complex factors which affect the domains - Methodology not clear stated - Lack of empirical research to test out the framework (Methodology)
A Framework of ICT exploitation for E-Participation Initiatives	Phang and Kankanhalli (2008)	Desk Research	E-Participation objectives and ICT exploitations—a three step procedure for E-Participation initiatives implementation	- Lack of web-based technology - Lack of non-technological factors which affect the E-Participation initiatives - Lack of empirical research (Methodology)

Table 1. *Cont.*

Framework	Author(s) (Year)	Methodology	Covered	Not Covered
A Sustainable E-Participation implementation model	Islam (2008)	Desk Research	Stages of E-Participation implementation	- Lack of stakeholders of the E-Participation implementation - Lack of complex factors which affect the E-Participation implementation - Lack of empirical research (Methodology)
Hands-On Guideline for E-Participation Initiatives	Scherer et al. (2010)	Desk Research, Case studies in Europe, Survey/ Questionnaires, Interview	A Six step iterative to develop and implement E-Participation successfully	- Lack of non-technological factors which affect the E-Participation initiatives, only political factor - Lack of evaluation framework - Lack of empirical research outside of Europe (Methodology)
Reference Framework for E-Participation	Scherer and Wimmer (2011)	Desk Research, Survey	Requirements of E-Participation project implementation	- Lack of non-engineering factors which affect the E-Participation projects - Lack of technology channels - Lack of Stakeholders - Lack of empirical research outside of Europe (Methodology)
Malaysia E-Participation Framework using Actor Network Theory (ANT) Approach	Bin Salamat and bin Hasan (2011)	Case study in Malaysia	E-Participation platform based on Malaysia case study and Actor Network Theory (ANT)	- Lack of complex factors which affect E-Participation implementation - Lack of explanation how the actor networks change and influenced each other - Lack of explanation about role of each technologies - Case study is broad and surface level (Methodology)
The shape of the E-Participation field revisited (2006–2011)	Medaglia (2012)	Literature reviews	E-Participation actors, activities, effects, evaluation and contextual factors	- Lack of complex factors - Lack of change factors - Lack of empirical research

Most e-participation studies take place in the political field, as Medaglia captured in his work, such as e-voting, online political discourse, online decision making, e-activism, e-consultation, e-campaigning, and e-petitioning. However, there are limited works on e-participation in the education field. Therefore, we were interested to explore e-participation within education, particularly schools.

Education is an important area of government for most countries. According to UNESCO, there are many reasons why education is important in reaching the Millennium Development Goals (MDGs), including the fact that more people would be able to grow, develop, and learn as a result of more equal and just societies, as well as living healthier lives. A good education is necessary to be more productive and provide the potential to be able to earn a higher wage [17,18]. Education is also one of the top government priorities in most countries, consuming resources and constituting a top issue in political debates. For instance, Nicky Morgan, the previous education secretary of the United Kingdom, stated that education is at the heart of the government's agenda [19]. Similarly, in Indonesia, the government (Nawacita) placed education third out of their nine top priorities, with the top three as follows: "*Firstly, increasing Indonesian quality of life through improving education and training through a program called Smart Indonesia; Secondly, revolution of the nation character through restructuration of national education curriculum; Thirdly, strengthening diversity and Indonesian social restoration through strengthening diversity education and creating a dialogue space between citizens*" [20].

High participation from all stakeholders in schools often results in good student performance. Corner and Haynes [18] argued that parents can contribute insights and knowledge that complement

the school staff to improve the quality of curricula and programs. Additionally, teachers' participation in school decision-making aims at increasing compliance with administrative decisions and accommodating teachers' rights and expectations as professionals [21]. Therefore, participation is a key area of high government–citizen interaction and participation from the local level in an educational establishment through to high-level national discussions in politics and popular media. For instance, Morgan [19] argued that schools should be fully integrated with the local community, local parents, and other schools. Many people have a particular concern about the quality of schools since they want the best start for their children. Similarly, Baswedan [22] persuaded people to participate in improving education. Digital citizen participation is a key component in education as one of the most important sectors in government. However, there is limited work covering digital participation in the education sector, which is a significant gap in the digital participation domain given the importance of education for government and society.

This paper aims to address this gap by exploring the role of technology in participation within school systems. Therefore, we also set the basic research question: What is the role of technology in the schools of the United Kingdom and Indonesia? Digital participation and education are also important in information systems (IS) research. As digital participation and the democratising potential of IT represent challenges for IS research, this paper explores how IT interacts with non-technological factors in complex settings in different contexts. This research will be analysed using Actor Network Theory (ANT) ([23–25]) which provides an understanding of the interaction and participation of school stakeholders and other elements. This paper makes a contribution by providing a model of digital participation in schools. This research investigates digital citizenship in the school context and discusses how various media support the participation of all school stakeholders. It also provides understanding about citizen engagement in schools.

This paper is structured as follows. First, it presents the introduction, which consists of defining digital citizen participation, the importance of citizen participation, changes in the citizen participation process, the importance of education, participation and digital citizen participation in education, the gap in the digital participation domain, our aims, contributions, and the main conclusions of the research. Next, the paper describes the research method in both case studies. Moreover, the paper will capture the research results contained in two case studies, showing similarities, differences, and a developed common ground model. Furthermore, it provides discussions of interesting points emerging from the case studies. Finally, we draw conclusions based on the research results, implications for theory and practice, as well as consequences for other researchers.

2. Methods

2.1. Step-by-Step Research Method

This section describes the methods used in this investigation. This research is an interpretive study. Walsham [26] argued that interpretive research is: "*Start from the position that our knowledge of reality, including the domain of human action, is a social construction by human actors. Our theories concerning reality are ways of making sense of the world, and shared meanings are a form of inter-subjectivity rather than objectivity.*" It is also qualitative research, which has the following characteristics: soft, flexible, subjective, political, case studies, speculative, and grounded [27,28]. Furthermore, this research uses a case-study approach because it fits with the interpretive paradigm and qualitative approach. Moreover, Orlikowski and Baroudi [29] states that case study research is the most widely used qualitative research method in information systems research, and is useful for capturing and understanding the context for studying phenomena using diverse data collection and analysis methods [30]. In addition, Yusuf, Adams and Dingley [31] found that case study research is the most dominant research in E-Government, in which e-participation is one of the main themes. It was also identified by Bannister and Connoly [32] that a case-by-case approach to investigation is dominant

in e-government. In a paper by Bolivar, Munoz and Hernandez [33] an empirical research method such as case studies is shown to be more prevalent than non-empirical methods in E-Government.

　　We conducted this research in both contexts for one year. Firstly, we developed a research design that consisted of choosing two comparative case studies in the education sector in the United Kingdom and Indonesia. Then, a literature review, pilot interview, and in-depth interview with similar stakeholders from both schools were developed. Secondly, existing e-participation frameworks in the literature were compared, resulting in an initial framework to which we applied the case studies. After that, the actual research method was as shown in Table 2.

Table 2. Step-by-step research method.

Step	Activity	Output	Validation (Y/N)
1	Exploratory study		
	a. Gathering information	Exploratory study result	
	b. Selection of significant issues in Hampshire, UK and Surabaya, Indonesia	Education issue was selected	Y
	c. Selecting schools in both contexts	A grammar school in Hampshire, UK and a private school in Surabaya, Indonesia	
	d. Investigation into both schools	Information about both schools	Y
2	Updated initial e-participation frameworks	E-participation frameworks for school version 1.0	Y
3	Selection of a theoretical tool	Used ANT	
4	Ethics review	Ethics review certificate	Y
5	In-depth interview process		
	a. Designed interview questions	List of interview questions	Y
	b. Pilot interview (mostly UK)	4 people interviewed	Y
	c. Approaching participation candidates, recruitment of participants, and in-depth interview conversation in the schools below:	Most interviews are maximum 60 min; just a few interviews are more than 60 min because there were interesting answers from the interviewees.	Y
	A grammar school in Hampshire, UK	3 people agreed to be interviewed	
	A private school in Surabaya, Indonesia	12 people agreed to be interviewed	
6	Coding process		
	a. Transcribing process	Interview transcripts	
	b. Coding activities through various techniques as following:		Y
	Coding process manually using MS Word and MS Visio based on transcript and audio recording of the interview	List of codes on MS Word	
	Coding process using NVIVO 10 based on the transcript and audio recording of the interview	List of codes on NVIVO 10	
	c. Classified into themes groups	6 themes	
7	Describe and classify the results of both case studies	● Description and classification of both case studies' results ● Model of participation in both schools	Y
8	Analysed similarities, differences, and common themes	Similarities, differences, and common themes	Y
9	Updated again model of participation in both schools	Common ground model of participation in both schools	Y
10	Develop model of e-participation for schools	Model of e-participation within schools	Y
11	Verification of the results and frameworks	Interview results and frameworks have been verified	Y
12	Interpretation, critical analysis, and reflection	● A model of e-participation within school ● A new definition of e-participation within school	Y

　　The research was started through an exploratory study consisting of investigation and selection of significant issues in Hampshire, United Kingdom, and Surabaya, Indonesia. We investigated information through Internet-based media, conference and journal papers, as well as a public talk. Education issues were selected as they are important for most countries. A grammar school in Hampshire, United Kingdom and a private school in Surabaya, Indonesia were selected as research sites. Both schools have similar characteristics and good management. Then, information about those schools was collected through the websites, Facebook, Twitter, and YouTube.

　　In the next step, we updated the initial framework and sub-frameworks of e-participation based on the result of exploratory studies. ANT was used as a theoretical tool to analyse the case studies,

which included an ethics review process to verify that the research was trustable. As discussed above, citizen participation is a complex topic often operating within a dynamic geopolitical and social environment. To analyse such a complex phenomenon requires good theoretical support that captures the interplay between people and technology. Actor Network Theory (ANT) is a good contender for such support. This section provides a literature review of ANT, which is used as the basis for analysis in this study.

Afterward, in-depth interviews were conducted, which consisted of designed interview questions, a pilot interview, approached and recruited participants, as well as interview conversations. We interviewed 19 people for pilot interviews and in-depth interviews, as presented in Tables 3 and 4. Those four interviewees for the pilot interview were a former parent at a grammar school in Hampshire, United Kingdom, a former school governor at another grammar school in the United Kingdom, a former teacher at a private school in Surabaya, Indonesia, and a parent of a schoolchild in Hampshire, United Kingdom. The two people chosen for in-depth interviews from a grammar school in Hampshire, United Kingdom were a deputy head of communication and co-curriculum, and a marketing manager and a parent. The 12 people chosen for in-depth interview from a private school in Surabaya, Indonesia were a head of school (a former vice head of school for curriculum), a former head of school, a vice head of school infrastructure (a former vice head of school for student affairs), two teachers, a member of administration staff, four alumni, a foundation staff member, and a parent. Those interviewees are the school stakeholders in both schools, even though they have different tasks. Moreover, the interviews were semi-structured. We have the list of interview questions; however, the interviews did not strictly follow the manuscript. When we found some interesting answers, we explored those topics in more depth. Also, we have to adjust the questions depending on the relevant interviewees.

Table 3. List of interviewees for pilot interviews.

Interviewee	Number of Interviewees
A former of parent at a grammar school in Hampshire, UK	1
A former school governance at another grammar school, UK	1
A former teacher at a private school in Surabaya, Indonesia	1
A parent of a schoolchild in Hampshire, UK	1

Table 4. List of interviewees for in-depth interviews.

School	Interviewee	Number of Interviewees
A grammar school in Hampshire, UK	Deputy head of communication and co-curriculum	1
	Marketing manager	1
	Parent	1
A private school in Surabaya, Indonesia	Head of school (former vice head of school for curriculum)	1
	Former head of school	1
	Vice head of school of infrastructure (former vice head of school for student affairs)	1
	Teacher	2
	Administration staff	1
	Alumni	4
	Foundation Staff	1
	Parent	1

After that, the interview results were coded, filtered, and classified into groups of themes. Basit [34] argued that coding, a crucial stage of qualitative data analysis, is tedious and time-consuming when carried out manually, and it may take several weeks to get acquainted with a software package

to code qualitative data electronically. Another researcher, Welsh [35] used NVIVO, and he argued that search tools in NVIVO allow the researcher to interrogate the data at a particular level. In this research, the coding process used various techniques and NVIVO 10 software. In the next step, we describe and classify the results of both case studies and end up with a diagram. Also, we developed a model of participation for each school that contains details of data that emerged from the research process.

Then, we analysed some similarities and differences as well as common themes from the results of both case studies. Furthermore, we developed a common model of participation in both schools. This model is based on the model of participation in each school, for which we identified similarities. As we are focusing on digital participation, we developed a model of e-participation within schools. This model focuses on electronic technology for supporting participation.

We also listened again to the interview results to verify the results, model, and sub-models. Then, interpretation, analysis, and reflection were done to understand the case studies in both contexts.

Validation was based on an iterative and reflective cycle to double-check the consistency of the results. The validations were investigated through resources and references, plus discussions with a former parent from the grammar school and a former teacher of the Surabaya school. The initial framework and sub-frameworks of e-participation were updated using ANT as well as based on the design and evaluation of interview questions, pilot interviews, and interview conversations, through re-listening to the interview results, interpretation and analysis of and reflection on the interview results.

2.2. Literature Review of ANT

This sub-section will explain Actor-Network Theory (ANT) based on our literature review. It is a concept developed by Callon, Latour, and Law in the 1980s [24,25,36]. It explains about networks that consist of heterogeneous or socio-technical elements called Actants, such as human, technological artefacts, organizations, institutions, and others ([25,37,38]). The actor in ANT is unique which has own theories, own frames, own context, own metaphysics, and own ontologies. Latour [39] explained that ANT is a theory of how to study things, particularly when things are changing fast and the boundaries are fuzzy. ANT can be used to describe something that does not all look like a network. Good fieldwork always produces a lot of descriptions. Therefore, ANT can be used as data description from the fieldwork and needs explanations when relevant [39]. ANT assumes that "social relations" are dependent on the material and natural world [37]. Table 5 shows some of the key concepts in Actor Network Theory (ANT) [40].

Table 5. Summary of some key concepts in Actor Network Theory (ANT) [10,40].

Concept	Description
Actor (or Actant)	Both human beings and non-human actors
Actor-network	Heterogeneous network of aligned interests, as follows: people, organizations, and standards
Enrollment and translation	Creating a body of allies, human and non-human, through a process of translating their interests to be aligned with the actor-network
Delegates and inscription	Delegates are actors who "stand in and speak for" particular viewpoints that have been inscribed in them
Irreversibility	The degree to which it is subsequently impossible to go back to a point where alternative possibilities exist
Black box	A frozen network element
Interresment	a process of convincing the other actors to accept and recognize definition of the focal actor
Immutable mobile	Network element with strong properties of irreversibility and effects that transcend time and place

This method is needed to help analyse unstructured cases that have unclear boundaries. It is widely used in Information System (IS) [41] as well as other subjects. When ANT is developed, it is not

alone; there are similar movements in feminist theory, cultural studies, social and cultural anthropology, and other parts of post-structuralism [42]. Some researchers addressed the limitations of ANT, such as Whittle and Spicer [43], who suggested that ANT actually has an ontologically realist, epistemologically positivist, and politically conservative account of organizing. ANT also failed to contribute to the development of critical approaches to organization. Moreover, Heeks and Stanforth [44] did interesting work on the mobilisation of local/global networks and Latour's theory about ANT and power related to this research. Additionally, Faik and Walsham [45] captured technological change and socioeconomic/political contexts. Additionally, Faik and Walsham [45] also used ANT for criticising dominant approaches that assume "an ontology of stacked levels that considers each level to be embedded in the higher ones or considers one level as the locus of action and others as constituting its context". That is an interesting alternative ontology that needs more investigation and empirical work in various subjects, especially for ANT researchers. Also, Sayes [46] examined the issue of symmetry between humans and non-humans. We argue that humans and non-humans have the same contribution even if they have a different role in influencing and developing actors, actants, network, local and global networks mobilisations; therefore we cannot exclude any groups from our research. Humans and non-humans complement each other with their own characteristics, behaviour, uniqueness, roles, activities, movements, identities, changes, developments, and evolutions. There are various ways to implement ANT in different subjects, as presented in Table 6. Based on Table 6, the dominant ways to apply ANT are identified as actors/actants, networks, problematization, interresment, enrollment, and mobilization.

Table 6. Research into ANT applications in various subjects.

Authors (s)	Title	Application Method
[47]	Machines and manoeuvres: responsibility accounting and the construction of hospital information systems	Identified actors and analysed interpretive approach about resource management and technology implementation
[48]	Boundary disputes negotiating the boundary between the technical and the social in the development of IT systems	Identified actors/actants, relationships, and changes
[40]	GIS for District-Level Administration in India: Problems and Opportunities	Telling a different story, anti-narrative, key events and phrase in the case. It also examining processes of network building in the case study
[49]	Drifting technologies and multipurpose networks: the case of the Swedish cash card	Identified actors, networks, interests and agenda
[50]	Implementing property tax reforms in Bangalore: an actor-network perspective	Provide themes related to problematization, interresment, enrolment, and mobilization
[44]	Understanding e-Government project trajectories from an actor-network perspective	Discussed local and global networks framework, network and project trajectory, as well as investigated network and power
[51]	Contextual dynamics during health information systems implementation: an event-based actor-network approach	(1) Identified significant dynamics related to implementation content (2) Used events to focus, structure, and present the ANT analysis
[52]	Constructing participation practice: ANT account	Discussed translation, sociology associations, and network building
[10]	An Actor Network Theory (ANT) approach to Malaysian e-participation framework	Identified group of user, the actor, and roles, the causes, building the actor network, obligatory passage point (OPP), obstacles, and enrolment
[45]	Modernisation through ICTs: towards a network ontology of technological change	Discussed ontological and methodological principles of ANT
[53]	The mobile media actor-network in urban India	Described actors, actor-networks, the four moments of translation: problematization, interresment, enrollment, and mobilization
[46]	Actor-Network Theory and methodology: Just what does it mean to say that non-humans have agency?	Understanding nonhumans exercise agency

Furthermore, we compared ANT with other relevant theories, such as the Social Shaping of Technology (SST), Institutional Theory, Structuration Theory, Stakeholder Theory, and Grounded Theory and performed an analysis of the advantages and disadvantages of each theory, as summarised in Table 7. This comparison aims to give a more balanced view of ANT and an appropriate explanation of why we use ANT in this research.

Table 7. Comparison of ANT and other relevant theories.

Theories	Brief Descriptions	Advantages	Disadvantages
The Social shaping of technology (SST)	This theory was developed by [54]. It explains that the design and implementation of technology are patterned by a range of factors, such as organizational, political, economic and cultural factors as well as technical considerations [55]	• Avoids "technological determinism" • Considers various factors, such as organisational, political, economic, and cultural • Considers technological change • Avoids generalisation • Cross-disciplinary	• Does not mention change factors • Does not examine power relations • Does not emphasize non-human factors • Does not emphasize local-global networks
Institutional Theory	According to [56], the concepts of institution and institutionalization have been defined in various ways, with substantial diversity among approaches, such as by Selznick, Berger and Luckman, Zucker, Meyer and Rowan, Hughes, Hertzler, Friedland and Alford	• Emphasize the importance of history, a holistic and contextual approach [57] • Consider complexity of institution • Examine social conditions • Capture processes in the institution	• Does not state about change factors • Does not examine about power relation • Does not emphasize non-human factors • Does not emphasize local-global networks
Structuration Theory	This theory was developed by sociologist Anthony Giddens. It proposes that agents and structures are not two independently and conflicting elements, but act as a mutually interacting duality	• Avoiding deterministic approach • According to [58], this theory has potential application in IS research in terms of operational studies, use as a meta theory, and use of individual concepts • According to [59] this theory is flexible and allows for combinations with other theories.	• We do not recognize power relations between local and global structures, change and complex factors, non-human factors. • According to [60], there are three criticisms, including the conflation of structure and human agent; the complexity and spread of the theory leading to contradictions; and a lack of assumptions and methodological guidelines.
Stakeholder Theory	It was originally developed by R. Edward Freeman in the book *Strategic Management*. This is a view of capitalism that stresses the interconnected relationships between a business, its customers, suppliers, employees, investors, communities, and others who have a stake in the organization [61]	• Covers all relevant stakeholders • It has attention to bigger perspective of values, not only money profits	• We do not recognize power relations between local and global structures, change and complex factors, non-human factors
Grounded Theory	Grounded theory was developed by sociologists Glaser and Strauss. It is a general inductive methodology involving the systematic generation of a theory from systematic research, and a set of rigorous research procedures leading to the emergence of conceptual categories	• Useful for developing theory from data • Powerful for collecting and analysing data	• According to [62] that Grounded theory has dilemmatic in term of "no preconceived ideas" and when researcher should finish analysis • Too rigid on the method and techniques
Actor-Network Theory (ANT)	It is a concept developed by Callon, Latour, and Law in the 1980s ([24,25,36]). It explains networks, which consist of heterogeneous or socio-technical elements called Actants, such as human or technological artefacts, organizations, institutions, and others	• Avoids a deterministic approach • It is an established theory in the sociology of science and technology and has been implemented in various subjects [63] • It seems suitable for describing the contexts of both case studies • It is usable in interpretative and qualitative research • It covers power relations, change and complex factors, including non-human factors	• Many controversies exist about this theory, particularly about non-human actors • Some researchers addressed the limitations of ANT, such as Whittle and Spicer [43], who argued that ANT is actually an ontological realist, epistemologically positivist, and politically conservative account of organizing. ANT also failed to contribute to the development of critical approaches to organization

In this research, we used ANT because it is an established theory in the sociology of science and technology and has been implemented in various subjects [63]. In addition, ANT is useful in interpretative and qualitative research, and can help us describe and understand the contexts of both case studies. In this paper, we used ANT as a theory and methodology to do this research.

We investigated stakeholders, support systems, and media as the actors/actants. Complex factors and interaction, communication, and participation are the actor networks. Changes are the enrollment, translation, and irreversibility. Complex factors are also the black box. Media and support systems are also delegates that have frozen organisational discourse and immutable mobiles. Complex factors and changes are local and global mobilization. Those things are included in the main concepts of ANT and can help to explain both case studies, which are unique, complex, unstructured, and have fuzzy boundaries.

3. Results

This part of the paper discusses the findings that emerged from the interview results and coding process. This section describes the analysis and is classified into six main themes: stakeholders, changes, supporting systems, media, complex factors, and interaction, communication, and participation. Those themes are also based on ANT perspective, which captures actors/actants, actor networks, enrollment and translation, delegates and inscription, irreversibility, black box, immutable mobile as well as local–global mobilization. Those key concepts of ANT will be explained in more detail in the methods section.

The results of each case study will be explained in more detail below. Dominant means those stakeholders and media have high influence on the interaction, communication, and participation process in both schools. There are also complex factors, such as legal, political, cultural, economics, educational, and others that influence the interaction, communication, and participation process in both schools. Additionally, channel technologies can be defined as technologies that act as a conduit for supporting the interaction, communication, and participation process in both schools. Then, school system technologies are various technologies that manage the data of teachers, parents, staff, and pupils in both schools.

3.1. A Grammar School in Hampshire, United Kingdom

This section moves on to describe in greater detail the result of the investigation in the selective grammar school. This school has four overlapping groups of stakeholders, as described in Figure 1: internal, external, dominant, and less dominant. The internal stakeholders are headmaster, students, teachers, senior management team (SMT), support staff, school governors, and headmaster. Furthermore, the external stakeholders are local businesses, international partners, the independent associations of prep schools (IAPS), the headmasters and headmistress conference (HMC), parents, local charities, local partners, and alumni. Moreover, the dominant stakeholders are parents, school governors, and staff. Additionally, the less dominant stakeholders in the school are local businesses, charities, and Portsmouth festivity organisers.
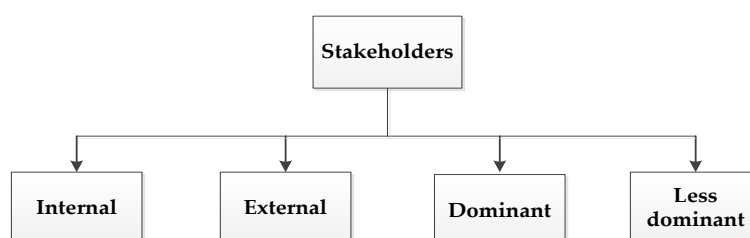
Figure 1. Model of stakeholders in a grammar school in Hampshire, UK.

Furthermore, the school uses various media for participation activities between all stakeholders, as shown in Figure 2. The first medium is technology-based/paperless, which can be classified into channels and school systems. The channels include (a) Internet-based, such as e-mail, websites, YouTube, Facebook, Twitter, virtual learning environment; and a weekly newsletter delivered electronically; (b) landline-based, such as telephone; (c) hardware, such as PC and iPad; (d) mobile-based, such as

mobile phones, iPads, and text message. Furthermore, the school system consists of pastoral care, staff, parents, pupils, and governors. The second one is non-technology/paper-based; for instance, the school produces a school magazine, letters, a parent forum, face-to-face meetings, a school diary, an alumni magazine, and a prospectus. The third is dominant media, such as a weekly electronic newsletter, the school website, school diary, and e-mails. The fourth is less dominant media, such as social media. E-mail is included in the first and third categories as it is a technology that has dominant influence or is used by many stakeholders in this school.
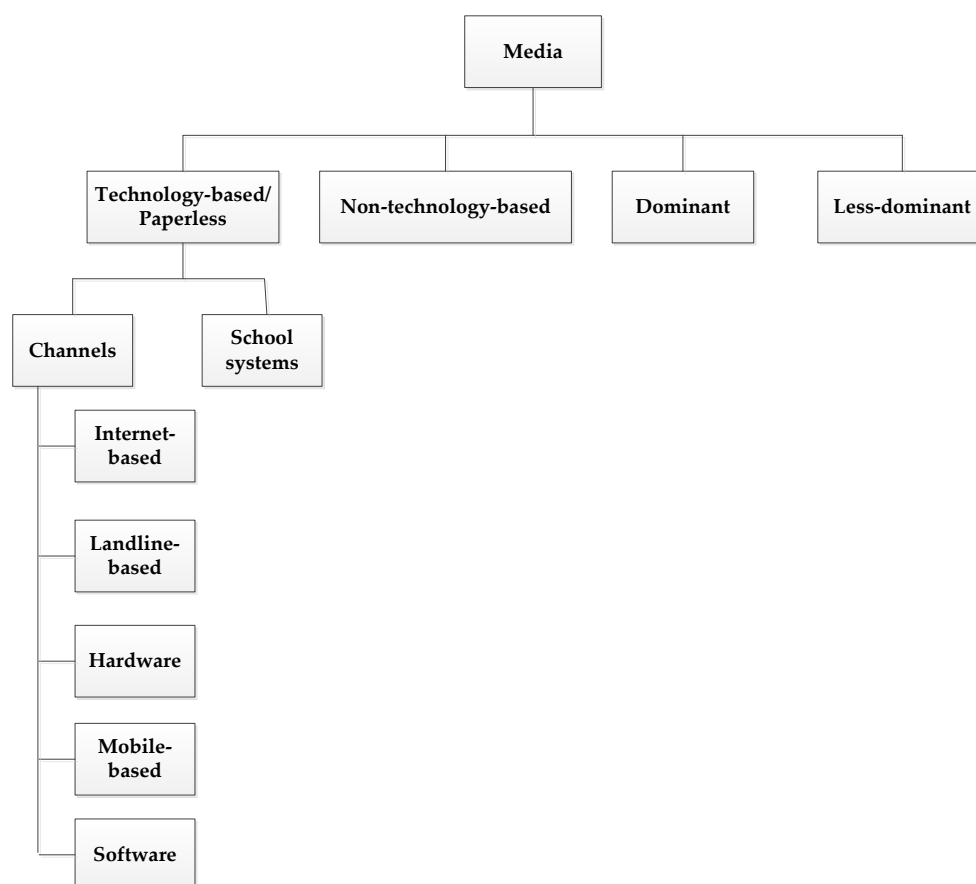
Figure 2. Model of media used in a grammar school in Hampshire, UK.

The school also has support systems for interaction, communication, and participation activities including an Internet policy, a digital council, social media policy, data protection policy, and other policies, such as food hygiene, safeguarding, and consent policies. Figure 3 shows the support systems in this school.
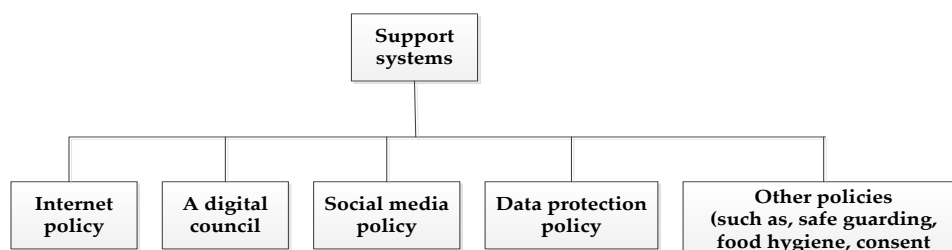
Figure 3. Model of support systems in a grammar school in Hampshire, UK.

Moreover, this researcher identified communication, interaction, and participation activities in the school and classified these into the categories below:

(a)　Type. This can be divided into informative, directive, responsive, consultative, and supportive activities. Communication, interaction, and participation through media (technology and non-technology) can be informative for disseminating information, particularly from the school to other stakeholders. For example, the grammar school publishes school magazines and newsletter to inform parents about school activities, changes of schedule, and other information. The school also has various media such as a virtual learning environment for giving direction to parents and pupils about what they have to do to support education processes. Furthermore, the grammar school uses Facebook, Twitter, e-mail, telephone, a virtual learning environment, and other activities such as face-to-face meetings to maintain responsive, consultative, and supportive activities between the school and stakeholders.

(b)　Level. According to Macintosh [3], there are three levels of participation: enabling, engaging, and empowering. Firstly, the enabling process is supporting those who would not typically access the Internet and take advantage of the large amount of information available. The grammar school has an enabling process by using paper-based media, such as face-to-face meetings and letters. Secondly, the engaging process indicates the process to reach out a wider audience for feedback on the policy-making processes. This process refers to top-down consultation. In this process, the school used a virtual learning environment, newsletter, and school magazines as media for top-down consultation from school to parents. Various technologies, such as e-mail, websites, Facebook, Twitter, and a parents' forum were used to support the engaging process, and parents can actively participate in the school policy-making process through those media. Thirdly, the empowering process is concerned with supporting active participation and refers to a bottom-up process to influence the policy-making stage. This step can be taken through various media and technology such as a parents' forum, e-mail, Facebook, Twitter, a virtual learning system, the newsletter, and school magazines.

(c)　Activities. There are various activities regarding communication, interaction, and participation, such as open evenings, an open morning when they advertise the school, informal team coffee sessions for parents, a parent–teacher association, association fundraising, and social events; parents can also participate by speaking to teachers and the headmaster in an informal setting.
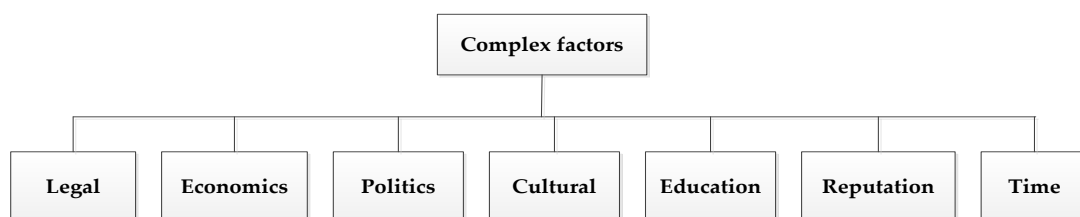
Figure 4 describes the interaction, communication, and participation in the grammar school.

Additionally, the school has complex factors that influence interaction, communication, and participation activities. The first is legal factors: the school has to follow rules and obey U.K. laws, as does every school or institution in the United Kingdom. The second factor is economics: the economy of the UK and indeed the whole world has suffered in the last few years, and the school has struggled but can survive. The third factor is politics: for example, health and safety regulations making certain school activities difficult may have a political basis. The fourth factor is culture: the students come from multicultural backgrounds, such as English, Chinese, and Russian. The fifth factor is education, with students coming from different schools. The sixth factor is the reputation the school has maintained as one of the oldest schools with good academic results. The seventh factor is time: for instance, one parent said he lacked the time for participation in school activities. Figure 5 shows the complex factors that influence this grammar school.

Also, there are some changes that influence the interaction, communication, and participation process in the school; for example, school governors and the Senior Management Team (SMT) are stakeholders who drive changes. School governors approve the changes and the SMT supports change through, for instance, building a brand new sixth form. Policy changes are often recommended and some low-level policies are changed by the SMT. The biggest change in the last five years was changing from printed/hard copy communication to paperless/e-mail/online. Figure 6 captures the change factors in this grammar school.
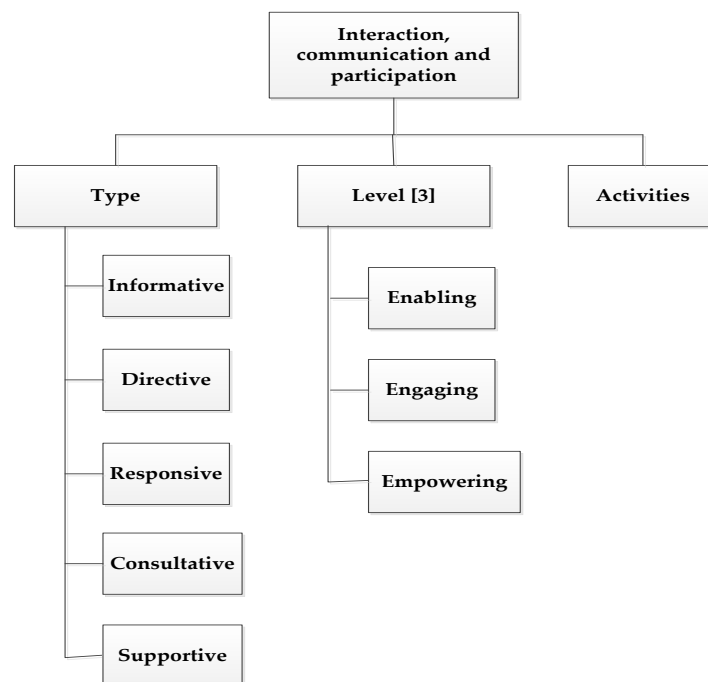
Figure 4. Model of interaction, communication, and participation in a grammar school in Hampshire, UK.

Figure 5. Model of complex factors which influence a grammar school in Hampshire, UK.
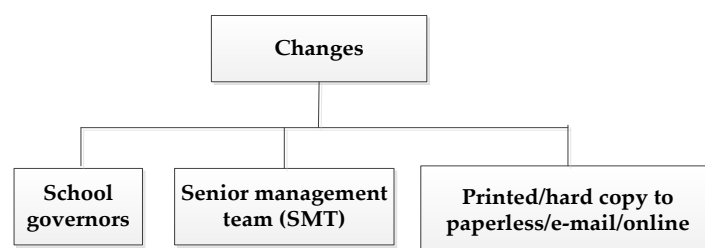
Figure 6. Model of changes that influence a grammar school in Hampshire, UK.

Based on the results above, we developed a model that describes the connection between those elements (actors, actants, and networks), as shown in Figure 7 below. Internal school stakeholders in Surabaya school have two various interaction, communication, and participation activities with external school stakeholders through numerous media. Those processes influence and are influenced by several support systems and complex change factors. The details of each element can be seen in the box.
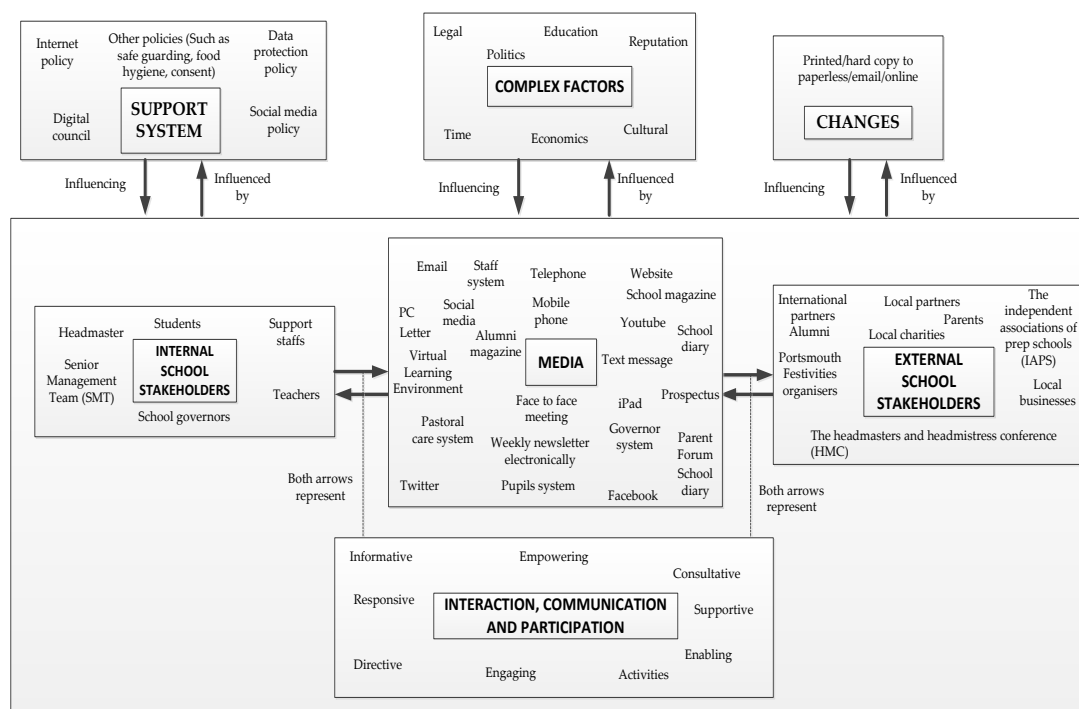
Figure 7. Model of participation in the Hampshire school.

3.2. A Private School in Surabaya, Indonesia

The school has four groups of stakeholders, internal, external, dominant, and less dominant, as described in Figure 8. The internal stakeholders are the head of school, vice head of school, school leaders, class teachers, and support staff. Moreover, the external stakeholders are a foundation body, the Ministry of Education and Culture of East Java province, the education and culture division of Surabaya City, the directorate of senior high school development, parents, school supervisors, school committees, the Islamic Education Consortium, UNESA (State University of Surabaya), people who lived around the school, police, village partners, other schools, and overseas universities. Then, the dominant stakeholders are the foundation (this is a legal body that has responsibility for the school, therefore the head of school is responsible to the foundation body), parents, school committees, officials from the Ministry of Education and Culture of Surabaya city, and others. In addition, the less dominant include the head of school, vice head of school, counselling staff, UNESA (State University of Surabaya), PASIAD Turkey, donors, security staff, and others.
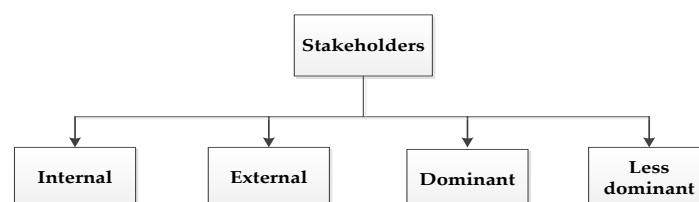

Figure 8. Model of stakeholders at a private school in Surabaya, Indonesia.

In this school, the stakeholders are using various media, as shown in Figure 9 Interaction, communication, and participation consist of technology and non-technology groups. Technology can be divided into channels and school systems. The channels can be categorised into (a) landline-based, such as telephones and internal telephones; (b) Internet-based, such as e-mail, websites, weblogs, YouTube, Facebook, e-Learning, and Hikmah Harmony (the school's weblog); (c) mobile-based, such as

mobile applications, mobile calls, and text messages; (d) hardware, such as laptops, smartphones, digital whiteboards, and LCD screens; and (e) software, such as PowerPoint and electronic worksheets. Another technology is a school system which manages database for managing all the information on teachers, parents, staff, and pupils. The stakeholders also use non-technology channels as follows: home calls, a school magazine, a parents' forum, face-to-face meeting, letters home, formal letters, and whiteboards. The dominant media in Surabaya school are landline telephones, mobile phones, WhatsApp, LINE, and letters. However, other media are also used but less frequently, such as e-mails.
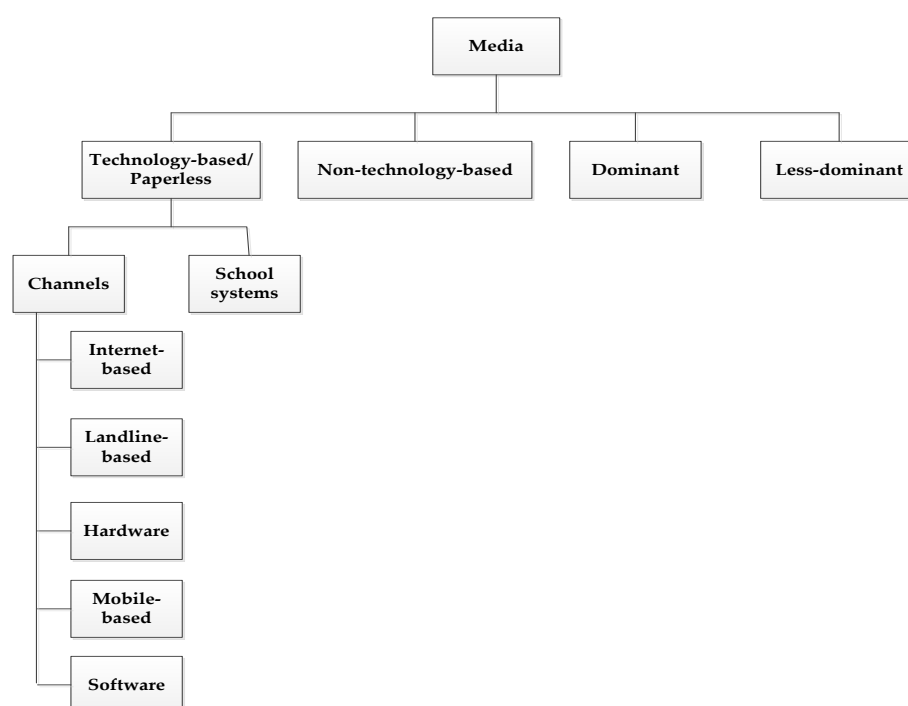
Figure 9. Model of media used in a private school in Surabaya, Indonesia.

The Surabaya school also has various support systems for supporting interaction, communication, and participation in the school: school regulations, unwritten rules, the spirit of interaction, personal interaction, a semi-formal organization for alumni, and standard norms. The former head of school mentioned the spirit of interaction as a support system. It seems that the former head of school has the perspective that support systems are not only tangible systems but also intangible systems. Figure 10 shows the support systems in this private school.
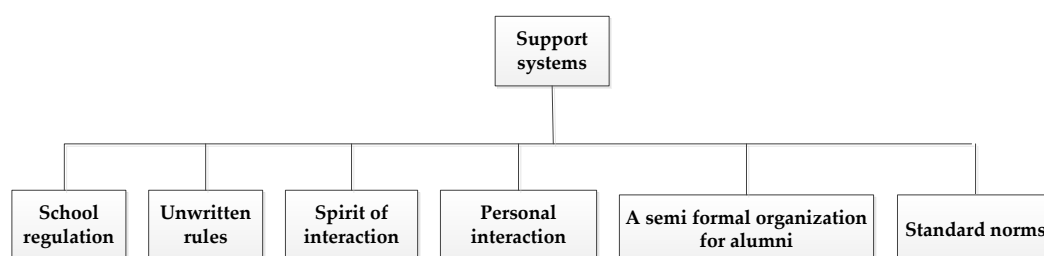
Figure 10. Model of support systems that influence a private school in Surabaya, Indonesia.

We identified communication, interaction, and participation activities in the private school and classified them into the same categories used for the Hampshire school. These are shown in Figure 11 and explained below:

(a) Type. This can be divided into informative, directive, responsive, consultative, and supportive activities. Communication, interaction, and participation through media (technology and non-technology) can be used to disseminate information, particularly from the school to other stakeholders. For example, the private school publishes a school magazine to inform parents about school activities. The school also has various media for giving directions to parents and pupils on how to support the education process, such as Hikmah Harmony, letters, and face-to-face meetings. Furthermore, the private school uses e-mail, the telephone, e-learning, and face-to-face meeting to support responsive, consultative, and supportive activities between the school and stakeholders.

(b) Level. According to Macintosh [3], the private school enables participation through face-to-face meetings, home calls, and letters. The school also uses the Hikmah Harmony weblog, landline and internal telephones, and mobile-based communication (mobile calls and text messages) in the engaging process. Furthermore, WhatsApp is used to encourage participation between stakeholders, especially teachers, staff, and school leaders.

(c) Activities. There are various activities related to communication, interaction, and participation, such as alumni talk; supervising student organisations; alumni meetings; administration services for staff, finances, students, and curriculum; counselling for students; alumni attending student organisation activities; foundation staff serving as a communicator link between school and foundation; and parents participating by speaking to teachers and the headmaster.
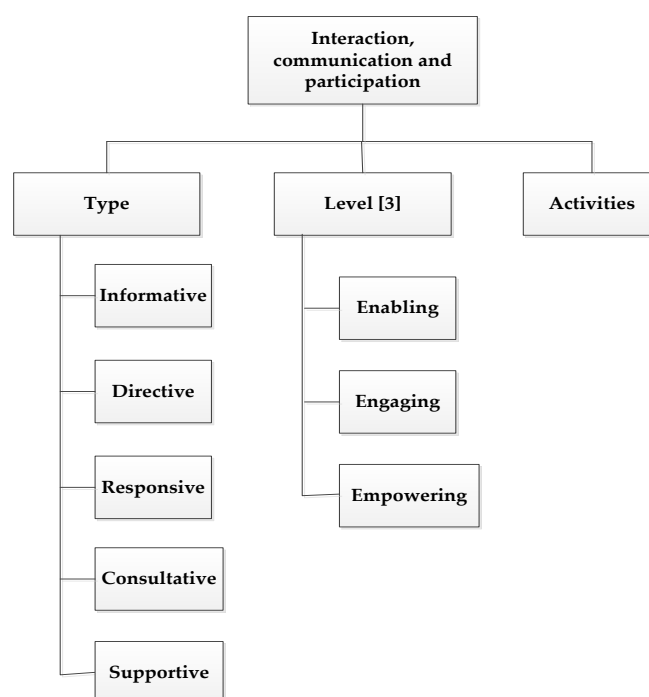
Figure 11. Model of interaction, communication, and participation and how they influence a private school in Surabaya, Indonesia.

This school also has complex factors that influence participation activities, as captured in Figure 12 below. The first is the legal factor, such as laws regarding Internet use and pornography. The second is the political factor, such as election education. The third factor is economics, such as saving paper and electricity. Students come from the upper class and therefore have good facilities, which also influence participation in school. The fourth factor is cultural, such as students and teachers coming from different ethnic backgrounds, which affects the language taught and the behaviour, and also different cultures between a student's home and school. The fifth factor is education, such as teachers'

skills and abilities and home supervision of work. However, some other interviewees explained that legal, political, economic, cultural, and educational issues do not influence participation in the school. The seventh factor is religion. The vice head of school infrastructure (a former vice head of school for student affairs) said that students who have good religious background based on Islamic materials in the school curriculum usually have better communication skills and strong self-confidence and more responsive. The eighth factor is the student's independence. Even though the school environment is already conducive to engagement, the students' independence factor is important l. The ninth is the safety factor. The school monitors how students can access the Internet safely. The tenth factor is the weather, which affects the physical health of teachers and pupils, especially when the weather is very hot and school activities are strenuous and outside. The eleventh is the communication factor. The school contacted their alumni to participate in some school activities, such as graduation and alumni sharing. The twelfth factor is the publication factor; for instance, some teachers discussed school activities on Facebook.
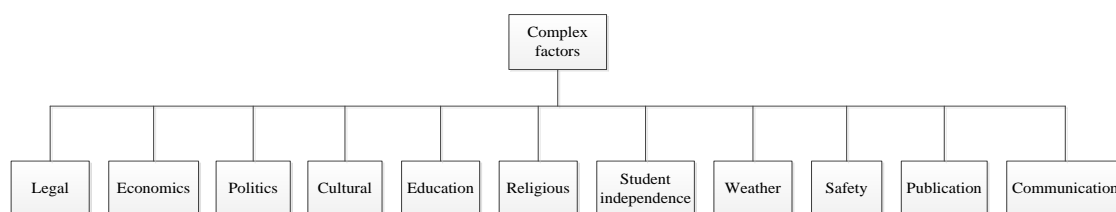
Figure 12. Model of complex factors which influence a private school in Surabaya, Indonesia.

The school also has some change factors, such as previously alumni only used mobile phones and face-to-face meetings and they now use Facebook and WhatsApp. We categorized those changes into types and stakeholders. The types of changes consist of curriculum, infrastructure, policy, facilities, and student organization. Additionally, stakeholders of change are the foundation, school committee, school leaders, and Ministry of Education and Culture. Figure 13 below shows the changes in this private school.
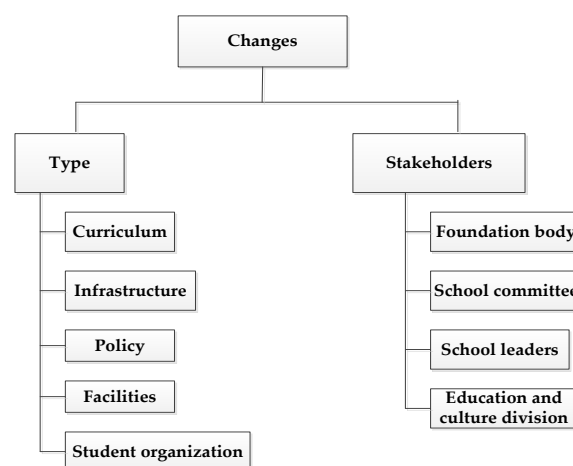
Figure 13. Model of changes which influence a private school in Surabaya, Indonesia.

Furthermore, we developed a model of participation in Surabaya school based on the above results and made connections between those elements as actors, actants, and networks, as shown in Figure 14. Internal school stakeholders in Surabaya school have various interaction, communication, and participation activities with external school stakeholders through numerous media. Those processes influence and are influenced by several support systems, complex and change factors. Additionally, details of each element can be seen in the box.
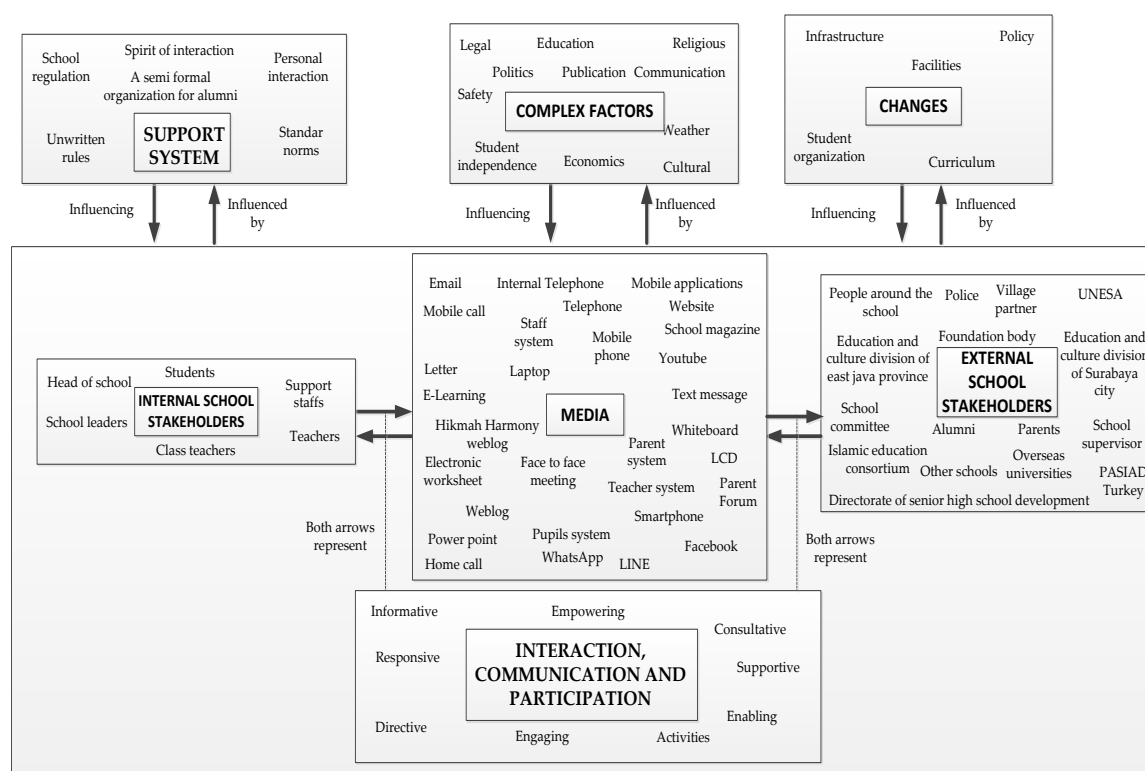
Figure 14. Model of participation in Surabaya school.

3.3. Similarities

This section captures the similarities in the two schools as we compare the results. Both schools have some similar stakeholders, just different terminology. In describing the similarities we use the first word (in italics) to represent the term used in the grammar school and the second or third word after the slash to represent the term used in the private school. Table 8 shows the similarities in the schools. However, it must be noted that the Indonesian titles are translated as closely as possible from Indonesian.

Table 8. Similarities between schools.

Themes	Similarities
Stakeholders	• *Headmaster*/Head of School • *Senior Management Team(SMT)*/Vice Head of School/School leaders • Teacher • Student • Parents • Support Staff: maintenance staff, library staff, security staff, cleaning staff, counselling staff, other staff • *School governors*/School Committee • Student Organisation • Alumni • Parents • Local partners/Trainer for extra curriculum/People around the school/Police • Local Business • Local Charities • *The Headmasters' and Headmistresses' Conference (HMC)*/Meeting of Head of schools

Table 8. *Cont.*

Themes	Similarities
Media	- Parent forum - Face-to-face meeting - E-mail - Virtual Learning Environment/E-Learning - Telephone/Internal telephone - Letter/Home letter/Formal letter - YouTube - Twitter - Facebook - School magazine - Website - Text message - PC - Pastoral care system/Counselling/Home call - Mobile phone/Mobile call - Staff system - Parent system - Pupil/student system - School governance/School committee system - Smartphone - Laptop - Website - PowerPoint - Worksheet - LCD - Local Radio - Skype - Digital/White Board
Supporting Systems	Policy/Regulation
Interaction, Communication, and Participation	- Level: Enabling, Engaging, Empowering (Macintosh, 2004) - Type: Informative, Directive, Responsive, Consultative, Supportive
Changes	- Type: Curriculum, policies, media - Stakeholders: School governors/School committee, Senior Management Team (SMT)/School leaders - Policy change recommended by Senior Management Team/School leaders/Head of school - Change from hard copy/paper-based only to paper-based and paperless
Complex Factors	- Legal influence - Political influence - Cultural influence - Economic influence - Educational influence

3.4. Differences

In this part, we identify differences between the two case studies through results categorized around the main themes. Table 9 captures the differences between the schools.

**Table 9.** Details of differences between the schools.

Themes	A Grammar School in Hampshire, UK	A Private School in Surabaya, Indonesia
Stakeholders	• The Independent Association of Prep Schools (IAPS) • International schools • National charities • International partners • County/regional partners • National partners • Portsmouth Festivities organisers	• Ministry of Education and culture of East Java province • Ministry of Education and Culture of Surabaya city • Directorate of senior high school development • School supervisor • Foundation • Konsorsium Pendidikan Islam (KPI)/Islamic Education Consortium • Village oartners • Other schools • Overseas universities
Media	• Weekly newsletter delivered electronically • School diary • Prospectus • an iPad • Alumni magazine	• LINE application • WhatsApp application • Hikmah Harmony • Blackberry Messenger • Weblog
Supporting systems	• Policies relating to use of the Internet • Digital council • Social media policy • Data protection policy • Other policies: food, safeguarding, etc. • Consent for student activities • Encouragement	• School regulations about interaction • Unwritten rules • Personal interaction • Spirit of interaction • Semi-formal organisation • Morality based on Islamic values • Unwritten agreement of communication • Standard norms • Standard rules • Written rules • Agreed norms • Quality control forum
Interaction, Communication, and Participation	Activities: • Open evenings or open mornings when they advertise the school; informal team coffee sessions for parents • parent–teacher association, association fundraising, • Social events; parents participate by speaking to teachers and the headmaster in an informal setting.	Activities: • alumni talks • supervising student organisations • alumni meetings • administration services for staff, finances, students, and curriculum; counselling for students • alumni attending student organisation activities • foundation staff as a communicator between each other school • Foundation and parent participates through speaking to teacher and headmaster.
Changes	• Governors approved change • Use social media as a formal school policy	• Foundation approved change • Change to using WhatsApp instead of face-to-face meetings • Social media used by stakeholders, but there is not a formal school policy
Complex factors	• Reputation factor influenced • Lack of Time for participation	• Legal factor did not influence • Politics did not influence • Economics did not influence • Religion influenced • Safety influenced • Students' independence influenced • Education did not influence • Culture did not influence • Communication influenced • Publication influenced • Psychology influenced • Weather factor influenced

Those complex factors in Table 2 are based on the interviewees' answers; however, we identified some factors in the Surabaya school that also influence the Hampshire school; for example, the weather influences many U.K. school activities, with fetes and fairs brought indoors in rainy weather and schools having to heat classrooms or send children home. Additionally, safety, students' independence, publications, and psychology are seen as influences at the grammar school as well.

3.5. Developed Model

There is lots of interaction and participation in the school, such as participation in learning, teaching, communication, interaction, and playing activities. After collating the results and according to the models of participation in both schools, a common ground model of participation was developed as shown in Figure 15. The framework describes the role of technology in participation in school systems as the aim of this research. It captures the fact that internal and external school stakeholders had interaction, communication, and participation with each other, as mediated by technology-based and non-technology-based methods. These processes influence and were influenced by numerous supporting systems, complex and change factors.
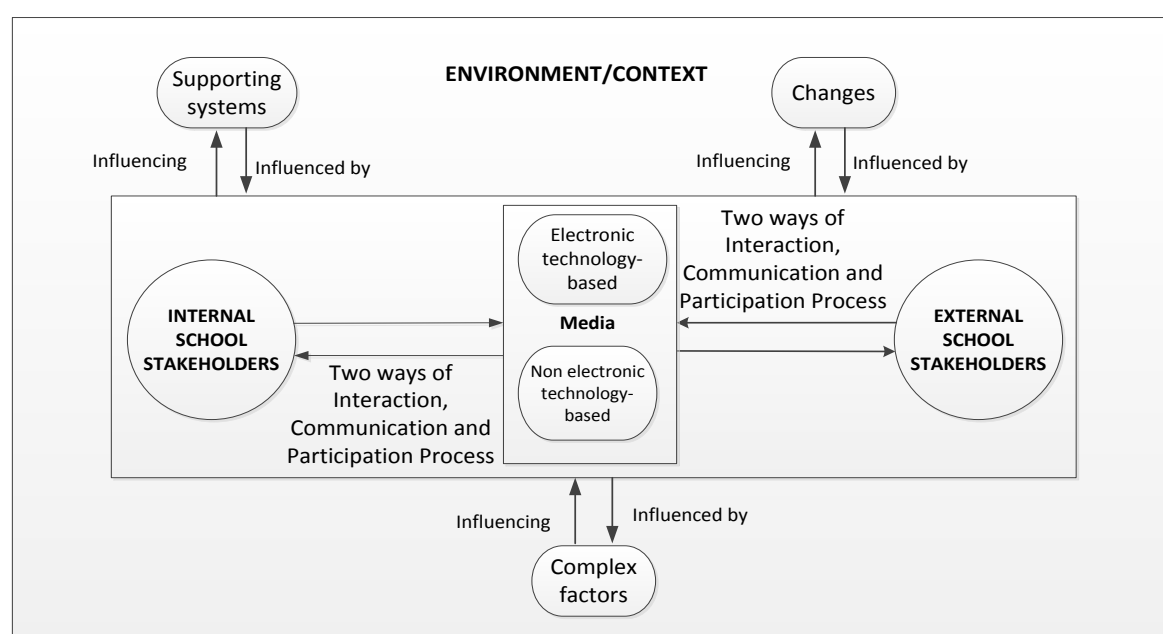
Figure 15. Common ground model of participation in both schools.

As this research focuses on e-participation, the researchers focused on electronic technology, as shown in Figure 16. Details of the electronic technology can be seen in the results section. From Figure 16, technology can be identified as an active agent supporting two-way interaction, communication, and participation processes.

Figure 16 enhances and complements the previous framework of e-participation, as presented in the introduction section and Table 1. This model of e-participation within schools consist of internal and external stakeholders, electronic technology, complex factors, changes, support systems, interaction, communication, and participation. Complex and change factors are not included in the previous works about frameworks of e-participation by other researchers.
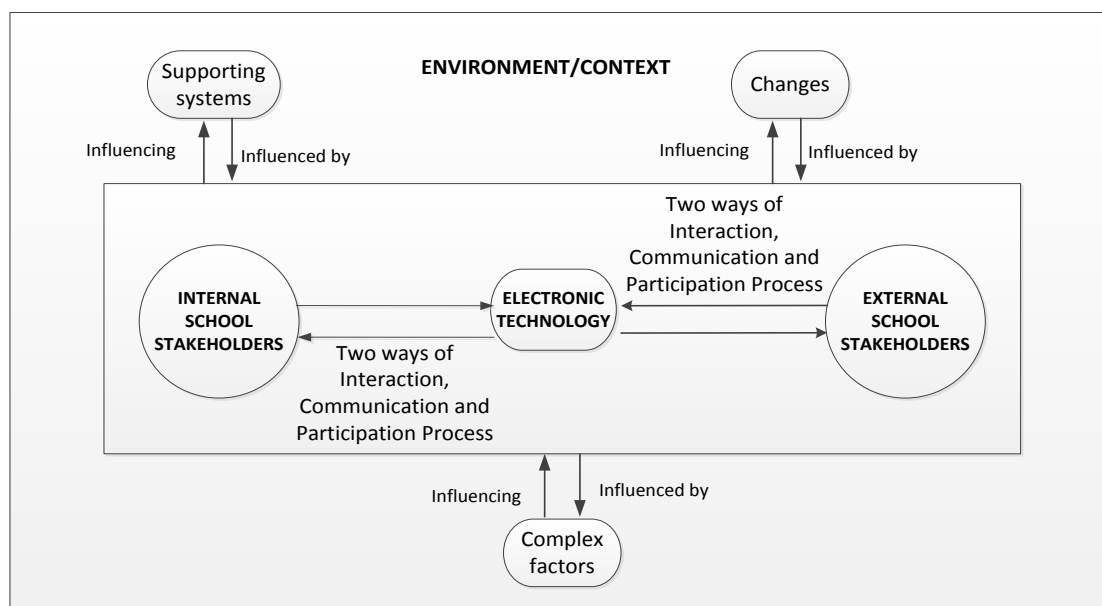
Figure 16. Model of e-participation within school.

4. Discussion

In this section, we discuss several points that contribute to the existing body of knowledge about e-participation and education research. Comparing the results, it can be seen that both schools in the case studies have lots of participation and technology plays a major role in facilitating participation, especially influencing those that did not have a voice previously. The types of participation are varied across stakeholders with a variety of media and support systems. Even though a school is a small environment, the framework of e-participation shows that a school is a complex system that consists of numerous and various subsystems and actors (human and non-human).

Citizen engagement supports decision-making at school through various activities such as consultation, discussions with teachers and the headmaster in formal and informal settings, and participation in various activities, such as open evenings, informal team coffee sessions for parents, the parent–teacher association, fundraising, and social events.

Schools are dynamic systems with subsystems and actors; their dynamic processes are influenced by complex external and internal factors. For example, some internal school policies keep changing to make them better and update them for new situations and challenges. External complex factors, such as social, political, and economic conditions in each context, are also always dynamic and those factors influence the school environment directly or indirectly. Change factors also influence the school environment. Therefore, a school is a dynamic environment.

Each sub-system and actor is unique and may have different activities at different times. For instance, alumnus 1 has different participation activities compared to alumnus 2, even though they are alumni of the same school and year. This uniqueness and complexity are in line with the ANT concept, which captures heterogeneous networks in digital participation within a school environment.

Each case study has different surrounding factors since these are dependent on the environment. These complex factors comprise various local and global actors, as captured by Law and Callon [64]. Moreover, we found three levels of participation relevant to the findings. Examples of this relevance are explained in the results section.

We indicate that traditional methods of communication and participation are still relevant in the Internet and social media era. Changes from non-technology/paper-based to technology/paperless have impacted formal system. For instance, schools use administrative staff to produce letters, but IT staff may be needed to handle the technology process. Also, changes of media from non-technology/paper-based to paperless/technology affect the speed of interaction, communication,

and participation. Paperless technology, especially social media, makes stakeholders more active instead of passive as paperless/technology-based media provide a communication interchange.

The model of e-participation in schools shows that stakeholders who implement technology in school should consider non-technological elements as well. The investigation of both case studies indicates that some elements can be generalized, but other elements should be contextualized since the complex factors are different based on the context. In relation to ANT, Hanseth, Aanestad and Berg [38] explained that all networks consist of heterogeneous, socio-technical, human, and non-human elements, which our analysis confirms.

Both schools use social media such as Facebook and Twitter for publishing their activities. There are formal policies for using these social media applications. Previously, Surabaya school did not use social media as a formal policy; social media was only used personally by internal stakeholders. However, a new head of school made the use of social media a formal policy. Therefore, a change in key actors influences the role of technology.

The above model of e-participation within schools is developed based on case studies from a grammar school in Hampshire, United Kingdom and a private school in Surabaya, Indonesia. Therefore, this model has limitations and may not be suitable or may need adjustment for use in schools in other countries. It also has limited application to other research fields.

In summary, we propose a new definition of e-participation within school as "*the various activities of interaction, communication and participation between numerous internal and external school stakeholders through several electronic technologies which are influencing and influenced by many complex factors, support systems and change factors*".

This definition extends and complements previous definitions of e-participation, such as the one by the United Nations (2016) mentioned in Section 1. Saebo, Rose, and Flak (2008) argue "The "e(lectronic)" in e-Participation has a clear association with earlier "e" disciplines (eBusiness, eGovernment) and refers to the use of new information and communication technologies (particularly the Internet), with the implication that the technology has the ability to change or transform citizen involvement in deliberation or decision-making processes"; Wikipedia (2016) defines e-participation as "ICT-supported participation in processes involved in government and governance". We use Wikipedia as it is a useful reference that provides relevant insight into the definition of e-participation. These definitions are summarised in Table 10.

Table 10. Table of e-participation definitions.

Defined by	Definitions of e-Participation
Saebo, Rose, and Flak (2008)	"The 'e (lectronic)' in eParticipation has a clear association with earlier 'e' disciplines (eBusiness, eGovernment) and refers to the use of new information and communication technologies (particularly the Internet), with the implication that the technology has the ability to change or transform citizen involvement in deliberation or decision-making processes"
Wikipedia (2016)	"ICT-supported participation in processes involved in government and governance"
United Nations (UN) (2016)	"Fostering civic engagement and open, participatory governance through Information and Communications Technologies (ICTs). Growing evidence points to the rapid expansion of e-Participation as a tool for engagement and strengthened collaboration between governments and citizens. Its objective is to improve access to information and public services as well as to promote participation in policy-making, both for the empowerment of individual citizens and the benefit of society as a whole"
Yusuf, Adams, and Dingley	The various activities of interaction, communication and participation between numerous internal and external school stakeholders through several electronic technologies which are influencing and influenced by many complex factors, support systems and change factors

5. Conclusions

Participation is an important and growing topic for researchers and government practitioners [1–3,5–10,13,18,21,40,52]. It has gained greater prominence since the advent of the Internet

and the move towards e-participation. Our findings show that technology changes e-participation activity by acting as a conduit. Our work has confirmed that schools are at the forefront of e-participation activity with many stakeholders including teachers, parents, students, alumni, school staff, and the wider society.

This paper has hoped to capture the complexity of e-participation in a dynamic school system context and produce a novel e-participation framework (Figure 16) that addresses the gap in literature regarding e-participation in the school environment. This complements existing works, such as [3–5], covering e-participation in other areas of government activity.

Of note is the further evidence for technology playing an influencing role in participation, namely that it acts as an enabling, engaging, and empowering agent. This research supports work from [3].

Our conclusions regarding the main findings and principal issues in this discussion are:

(1) Technology and related media change and influence participation between stakeholders.
(2) There are similar sets of complex factors covering the different school systems in the two countries.
(3) Each context has its own unique and complex factors.
(4) School systems operate in a social context and dynamic environment, so relevant citizen participation needs to be considered within this social and dynamic context. Citizen participation is a multidimensional process with many factors.
(5) ANT is a relevant tool for investigating citizen participation in an increasingly technology-dominated world. It is particularly powerful in capturing the influence of technology and related media in the participation process.
(6) Research into non-key concepts of ANT may provide other new and interesting insights into ANT.
(7) Implementation of technology in a particular context/environment should include non-technological factors.
(8) Multiple comparative case studies are useful for bringing out the differences and similarities between case studies.

These issues and themes complement those covered in the e-participation studies (see Table 1), particularly capturing the role of technology as an active agent changing the participation landscape.

This research also contributes by providing a framework based on the ANT perspective for capturing e-participation in schools, particularly identifying the influencing role of technology as a conduit for enabling, engaging, and empowering participation from stakeholders in this important sector, extending work from [3]. This work has also made a contribution in terms of the use of ANT within the complex school environment and the use of comparative case studies as a research method to capture factors in complex environments.

There are implications for theory as follows: Firstly, the paper develops a model of e-participation within school that will add to the existing body of knowledge of e-participation. Secondly, it demonstrates how to apply ANT in e-participation and education research by using comparative case studies. Table 6 shows that there is limited research covering the application of ANT within e-participation and education fields. Also, the implications for practice are that the SMT or school leaders are advised to take complex change factors into account when considering the participation and engagement of the various stakeholders, particularly in implementing technology and support systems in the school. They should consider that once technology arrives it will be used, even if formal policies or systems are not in place to control its practice.

This research has some consequences for other researchers; for example, in-depth comparative case study research is a rich but unstructured field calling for more work; a theoretical tool is needed to make the research more structured. Our research method can be used by other researchers in other contexts, particularly using comparative case studies coming from different parts of the world. This can be extended to more than one school in each country with similar or different characteristics. Schools can also learn from this paper about school activities in different parts of the world. Other areas of government can learn from this research about the role of technology in supporting citizen participation. Dominant and less dominant actors should be considered by the

government for mapping power structures and how these can evolve with the implementation of technology in other sectors. The framework would also be of use to practitioners and researchers in providing a structure for considering how government agencies and stakeholders can interact with citizen stakeholders. As can be seen, the framework captures the importance of the different communication channels between these stakeholders.

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Conflicts of Interest: The authors declare no conflict of interest.

Abbreviations

The following abbreviations are used in this paper:

ANT	Actor-network theory (ANT)
UK	United Kingdom
ICT	Information and communication technology
UNESCO	The United Nations Educational, Scientific, and Cultural Organization
MDGs	Millennium Development Goals
IT	Information technology
SMT	Senior management team
IAPS	The independent associations of prep schools (IAPS)
HMC	The headmasters and headmistress conference (HMC)
UNESA	Universitas Negeri Surabaya
LCD	Liquid crystal display
PASIAD	Pacific Countries Social and Economic Solidarity Association
KPI	Konsorsium Pendidikan Islam

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