Unpacking the Impact of Voting Advice Applications on Pre-Voters' Political Attitudes

An Experimental Field Study on the Effects of the *Test électoral éducatif* in Walloon Schools in 2020

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Abstract

(in English, French, and Dutch)

EN: The *Test électoral éducatif* is a Voting Advice Application (VAA) that provides citizens with personalized information about their ideological profile by comparing their positions on a selection of political issues with those of political parties. In practice, users fill in an online survey according to their opinions on a set of issues. By comparing their position with those of political parties, the applications generate voting advice. Although one of the purposes of VAAs is to engage young individuals and those who are uninterested in politics, there is a lack of field research examining the effects of VAAs on young people, particularly research that addresses political inequalities. Our research focuses on pre-voters, i.e., individuals aged between 16 and 18, as we acknowledge that this is a key time for the development of political attitudes. Therefore, we form three research questions. The first one constitutes the lead research question of the present study: To what extent does a VAA have an impact on pre-voters' political efficacy and trust? (RQ1) We also wonder whether VAA effects last, and whether the app succeeds in addressing the inequalities in political resources based on individuals' socio-economic status (SES). Hence, we ask the following two sub-questions: To what extent does a VAA have a lasting impact on pre-voters' political efficacy and trust? (RQ2), and to what extent is there a difference in VAA effect based on SES? (RQ3).

To isolate the effect of VAA usage from other variables in a natural classroom setting, we set up an original and replicable mixed experimental design within and between-subjects. The experiment takes place in natural classroom or computer room settings with fifth- and sixth-year secondary pupils in schools across Wallonia (Belgium). Data collection was carried out in three waves, from January 20 to April 3, 2020. The three-wave design allows controlling for pre- and post-exposure measures of the independent and dependent variables. Our experimental study makes it possible to disentangle three kinds of VAA effects: the statement effect – the effect resulting from simple exposure to VAA statements, the advice effect – the effect resulting from receiving voting advice related to the VAA use, and the match effect – the effect resulting from matching the advice with the user's prior party preferences (incongruent, congruent, or activating advice). We hypothesize that exposure to VAA statements has a positive impact on pre-voters' internal and external political efficacy (IPE and EPE) and political trust (Hypotheses 1 to 3), and that VAA advice exposure has a positive impact on pre-voters' political efficacy and trust (Hypotheses 4 to 6). Regarding match effect, we hypothesize that incongruent advice exposure has

a negative impact on pre-voters' political attitudes, while we expect that congruent and activating advice exposure have a positive impact on these attitudes (Hypotheses 7 to 9).

The findings reveal the complexity of VAA effects. First, it is found that exposure to VAA statements positively influences pre-voters' IPE. Second, advice exposure is found to build up pre-voters' political trust. Third, the findings show that pre-voters exposed to VAA advice tend to feel less IPE immediately after intervention. At the end of the study, they restore their initial level of IPE. Fourth, we do not find that incongruent advice exposure mitigates participants' political efficacy and trust, contrary to what was hypothesized. Fifth, the congruent advice effect is found to be the largest effect among all, with a positive impact on EPE and political trust. And the last innovative result that emerges from our study is that activating advice exposure has a positive impact on political trust.

Keywords: Experimental Methods; Political Efficacy; Political Trust; Pre-Voters; *Test électoral*; Voting Advice Applications; VAA; Wallonia; Youth

FR : Le Test électoral éducatif est un système d'aide au vote (SAV) qui fournit aux citoyens des informations personnalisés sur leur profil d'électeur en comparant leurs opinions politiques avec celles des partis politiques. En pratique, les utilisateurs complètent un formulaire en ligne sur leurs opinions à propos d'une série d'enjeux politiques. En comparant leur position avec celle des partis politiques, l'application génère un conseil de vote. Bien qu'un des objectifs des SAVs est de mobiliser les jeunes citoyens et ceux qui ne sont pas intéressés par la politique, on dénote un manque de recherche empirique qui étudie les effets des SAVs chez les jeunes plus particulièrement, et abordant les inégalités politiques. La focale de cette recherche est placée sur les citoyens pré-votants, les individus âgés entre 16 et 18 ans, sur base du constat qu'il s'agit d'un âge charnière dans le développement d'attitudes politiques. De ce fait, nous posons trois questions de recherche. La première constitue la question principale de la présente recherche : Dans quelle mesure un SAV a-t-il un impact sur les sentiments d'efficacité et de confiance politique des citoyens pré-votants ? (RQ1). De plus, nous nous demandons si les effets des SAVs persistent dans le temps et si ces applications participent à pallier aux inégalités en terme de ressources basées sur le statut socio-économique (SSE) des individus. Ainsi, nous posons les deux sous-questions suivantes : Dans quelle mesure un SAV a-t-il un effet durable sur l'efficacité et la confiance politique des citoyens pré-votants ? (RQ2) et dans quelle mesure y-a-t-il une différence d'effet des SAVs basés sur le SSE ? (RQ3).

Afin d'isoler l'effet de l'utilisation d'un SAV d'autres variables dans un contexte naturel de salle de classe, nous avons mis en place un protocole expérimental mixte intra et inter-sujets original et réplicable. L'expérience a lieu dans un contexte naturel de salle de classe ou salle informatique, avec des élèves de 5ème et 6ème année de l'enseignement secondaire, dans des écoles wallonnes (Belgique). La collecte de données s'est déroulée en trois vagues, du 20 janvier au 3 avril 2020. Le dispositif en trois vagues permet de contrôler pour les mesures pré et post-exposition des variables indépendantes et dépendantes. Notre étude expérimentale permet de démêler trois types d'effets des SAVs : l'effet des énoncés – qui résulte de la simple exposition aux énoncés d'enjeux politique du SAV ; l'effet du conseil – qui résulte de l'exposition à un conseil de vote lié à l'utilisation d'un SAV ; et l'effet de correspondance – qui résulte de la concordance du conseil de vote par rapport aux préférences partisanes initiales de l'utilisateur (conseil incongruent, congruent, ou activateur). Nous émettons l'hypothèse que l'exposition aux énoncés du SAV a un impact positif sur l'efficacité politique interne, externe (EPI et EPE) et la confiance politique des citoyens pré-votants (hypothèses 1 à 3) et que l'exposition à un conseil a un impact positif que l'efficacité et la confiance politique (hypothèses 4 à 6). En ce qui concerne l'effet de correspondance, nous postulons que l'exposition à un conseil incongruent a un impact négatif sur les attitudes politiques des citoyens

pré-votants, tandis que nous postulons que les conseils congruents et activateurs ont un impact positif sur ces attitudes (hypothèses 7 à 9).

Nos résultats révèlent la complexité des effets du SAV. Premièrement, l'on constate que l'exposition aux énoncés d'un SAV influence positivement le sentiment d'EPI des citoyens pré-votants. Deuxièmement, l'exposition à un conseil participe au développement du sentiment de confiance politique des citoyens pré-votants. Troisièmement, les résultats montrent que les citoyens pré-votants exposé à un conseil de vote d'un SAV tendent à démontrer un sentiment d'EPI amoindri à la suite de cette exposition. Toutefois, à la fin de l'étude, ils retrouvent leur niveau moyen initial d'EPI. Quatrièmement, nous n'avons pas constaté que l'exposition à un conseil incongruent atténue l'efficacité et confiance politique des participants, contrairement à l'hypothèse émie. Le dernier résultat innovant qui émerge de notre étude est que l'exposition à un conseil activateur a un impact positif sur la confiance politique.

Mots clés : Citoyens Pré-Votants, Confiance Politique, Efficacité Politique, Jeunesse, Méthodes Expérimentales, Systèmes d'Aide au Vote, SAV, Test Electoral, Wallonie

NL: De Educatieve Stemtest is een stemadviesapplicatie die burgers gepersonaliseerde informatie geeft over hun ideologisch profiel door hun politieke meningen te vergelijken met die van de politieke partijen. In de praktijk vullen gebruikers een online vragenlijst in op basis van hun mening over een reeks beleidskwesties. De stemtest genereert dan een stemadvies door hun standpunten te vergelijken met die van politieke partijen. Hoewel een van de doelen van stemtesten is om jongeren en ongeïnteresseerden meer bij de politiek te betrekken, ontbreekt het aan onderzoek naar de effecten van stemtesten op met name jongeren en of stemtesten politieke ongelijkheden aanpakken. Ons onderzoek richt zich op pre-kiezers, d.w.z. individuen tussen 16 en 18 jaar, aangezien dat dit een belangrijke periode is voor de ontwikkeling van politieke attitudes. We stellen drie onderzoeksvragen. De eerste vormt de hoofdvraag van dit onderzoek: In hoeverre heeft een stemtest invloed op het gevoel van politieke effectiviteit en het vertrouwen van pre-kiezers? (OV1) Verder vragen we ons af of de effecten van stemtesten duurzaam zijn en of de applicatie erin slaagt de ongelijkheid op basis van de sociaaleconomische status (SES) van individuen aan te pakken. We stellen daarom ook de volgende twee deelvragen: in hoeverre heeft een stemtest een blijvende impact op de politieke doeltreffendheid en het vertrouwen van pre-kiezers? (OV2) & in hoeverre is er een verschil in stemtesteffect op basis van SES? (OV3).

Om het effect van stemtestgebruik te isoleren van andere variabelen in een natuurlijke klasomgeving, hebben we een origineel en repliceerbaar gemengd experimenteel design opgezet, dat zowel binnen als tussen de proefpersonen vergelijkt. Het experiment vindt plaats in een klas- of computerlokaal met leerlingen van het 5e en 6e jaar van het secundair onderwijs in scholen in Wallonië (België). De gegevens werden verzameld in drie golven, tussen 20 januari en 3 april 2020. Het ontwerp met drie golven maakt het mogelijk om te controleren op maatregelen voor en na de blootstelling aan de onafhankelijke en afhankelijke variabelen. Onze experimentele studie helpt ons drie soorten stemtesteffecten te onderscheiden: het stellingeffect - het effect van de eenvoudige blootstelling aan stemteststellingen; het advieseffect - het effect van het ontvangen van stemadvies op basis van de stemtest; en het matcheffect - het effect van de afstemming van het advies op de voorafgaande partijvoorkeuren van de gebruiker (incongruent, congruent of activerend advies). Wij veronderstellen dat blootstelling aan stemteststellingen een positief effect heeft op de interne en externe politieke doeltreffendheid en het politieke vertrouwen van pre-kiezers (hypothesen 1 tot en met 3) en dat blootstelling aan stemtestadvies een positief effect heeft op de politieke doeltreffendheid en het politieke vertrouwen van pre-kiezers (hypothesen 4 tot en met 6). Wat het matcheffect betreft, veronderstellen wij dat blootstelling aan incongruent advies een negatief effect heeft op de politieke attitudes van pre-kiezers, terwijl we verwachten dat blootstelling aan

congruent en activerend advies een positief effect heeft op deze attitudes (hypothesen 7 tot en met 9).

De bevindingen onthullen de complexiteit van stemtesteffecten. Ten eerste blijkt dat blootstelling aan stemtestboodschappen een positieve invloed heeft op de interne politieke doeltreffendheid van pre-kiezers. Ten tweede blijkt dat blootstelling aan stemtestadviezen het politieke vertrouwen van pre-kiezers versterkt. Ten derde blijkt dat de interne politieke doeltreffendheid van pre-kiezers daalt onmiddelijk na blootstelling aan stemtestadviezen. Aan het einde van de studie bereiken de deelnemers weer hun oorspronkelijke niveau van interne politieke doeltreffendheid. Ten vierde vinden we geen bewijs voor de hypothese die stelt dat dat blootstelling aan incongruent advies de politieke doeltreffendheid en het vertrouwen van de deelnemers vermindert. Ten vijfde blijkt het effect van congruent advies het grootste van alle effecten te zijn: congruent advies heeft een positief effect op de externe politieke doeltreffendheid en politiek vertrouwen. Ten slotte blijkt uit onze studie dat blootstelling aan activerend advies een positief effect heeft op politiek vertrouwen.

Sleutelwoorden: Experimentele methoden; Jongeren; Politieke doeltreffendheid; Politiek vertrouwen; Pre-kiezers; Stemtest; Stemadviesapplicaties.

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List of Abbreviations

ANOVA	Analysis of Variance
ATE	Average Treatment Effect
Behav.	Behavior
CAVAA	Conversational Agent Voting Advice Applications
DV	Dependent Variable
EPE	External Political Efficacy
Fin.	Financial
H	Hypothesis
ICT	Information and Communication Technology
IPE	Internal Political Efficacy
IV	Independent Variable
M	Mean
Mat.	Material
N	Sample Size
Pol.	Political
PTV	Propensity to Vote
RQ	Research Question
RTBF	*Radio-télévision belge de la Communauté française*
SD	Standard Deviation
SE	Standard Error
SES	Socio-Economic Status
VAA	Voting Advice Application
VEA	Voter Engagement Application
W	Wave

Chapter One: General Introduction

1.1. Framework of the Research

Political systems in many Western democracies are built upon their citizens' support. Healthy representative democracies also rely on citizens' engagement (Borgonovi & Pokropek, 2017). Yet, we know that we have not achieved the ideal model of representative democratic systems. The literature often depicts citizens as losing faith in government and pulling away from the political arena (Citrin & Stoker, 2018; Goovaerts et al., 2020; Grönlund & Setälä, 2007). A growing number of voters sense a gap between their expectations and actual institutional performance, resulting in political distrust or mistrust (Citrin & Stoker, 2018; Grönlund & Setälä, 2007). Party politics is often viewed as a conflictual, complex, or dull topic, especially among young people (Delli Carpini, 2000; Dostie-Goulet & Guay, 2014). In addition, lower levels of political efficacy are associated with higher levels of political dissatisfaction (Campbell et al., 1954; Niemi et al., 1991). When individuals believe that their participation can make a difference and has an impact on political outcomes, they are more likely to feel satisfied with the political system. In contrast, when individuals feel powerless, or that their participation is futile, they are more likely to feel dissatisfied with the political system.

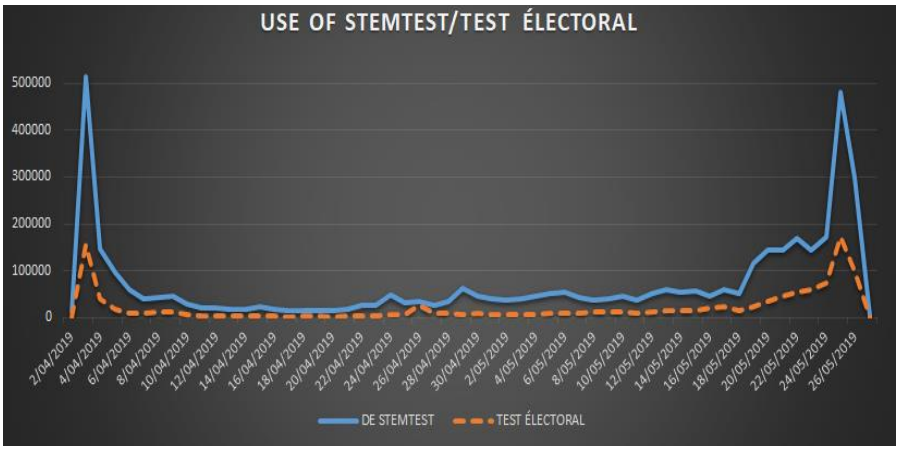
Thereupon, public authorities and grassroots organizations have made countless efforts to restore citizens' political efficacy and trust, and to involve them in the realm of politics. Many such initiatives have introduced innovative democratic resources aiming to make politics attractive and intelligible to citizens from a young age. Among these resources, available to young and old alike, we can mention citizenship education programs, youth or citizen assemblies, but also Voting Advice Applications (VAAs).

It is on the last of these that this research focuses, in order to contribute to our understanding of citizens' political enfranchisement. VAAs are online platforms that link voters' preferences to parties' policy proposals; these tools then highlight the proximity between the user and the available political parties. In practice, users fill in an online survey according to their opinions on a set of issues. By comparing their position with those of political parties, the applications generate voting advice and suggestions. They aim to provide accessible, interactive, tailor-made content to inform and educate all citizens, but foremost help younger and less educated ones. The claim is to provide citizens, especially those who are less interested or informed about politics, with "valuable information about candidates and parties running for elections, support

citizens in the decision-making process in the course of elections, and allow for electoral choices which are closer to the political position of the voters" (Garzia & Marschall, 2014). In that sense, such interactive tools are intended to help take up the challenge to tackle political inequalities.

Moreover, VAAs are commonly used during election campaigns. The 2019 Belgian VAA, – i.e., the *Test électoral* (French-language version) or *Stemtest* (Dutch-language version) – received a significant amount of interest and participation on its launch day and in the following days (see Figure 1 below). The second peak was reached in the last few days before the election (including election day). Despite their high rate of use, little is known about the effects of these apps on political attitudes, on young people, or beyond the reach of election campaigns.

Figure 1. Daily Use of the *Test électoral/Stemtest*



Note: Figure from Uyttendaele et. al. (2020)

The present study aims to provide answers about whether VAAs succeed in meeting their purposes. We identify seven gaps that this research aims to fill (see also Chapter Two, Section 2.4.3 for further discussion on VAA research gaps): (1) There is a lack of research assessment on the effects of VAAs on users' political attitudes, although VAA scholars continue to advocate the tool's potential to foster democratic attitudes among users; (2) There is no empirical research on VAA effects on school-aged users, although VAA designers are aware that their instruments are used in classrooms; (3) There is no empirical assessment on the relevance of VAA use outside election campaigns, although the VAA research community is also well aware that citizens get to use these instruments outside of election campaigns; (4) There is little research addressing political inequalities, although one of the applications' purposes is to engage individuals who are uninterested in politics; (5) There is no assessment of VAAs' lasting impact, although proponents argue for the applications' meaningful implications for representative democracies. (6) There is little research using experimental settings, although VAA research suffers from a recurring sample self-selection bias; and (7) There is a lack of knowledge about the effect mechanisms of VAAs, although it is accepted that they are various and complex.

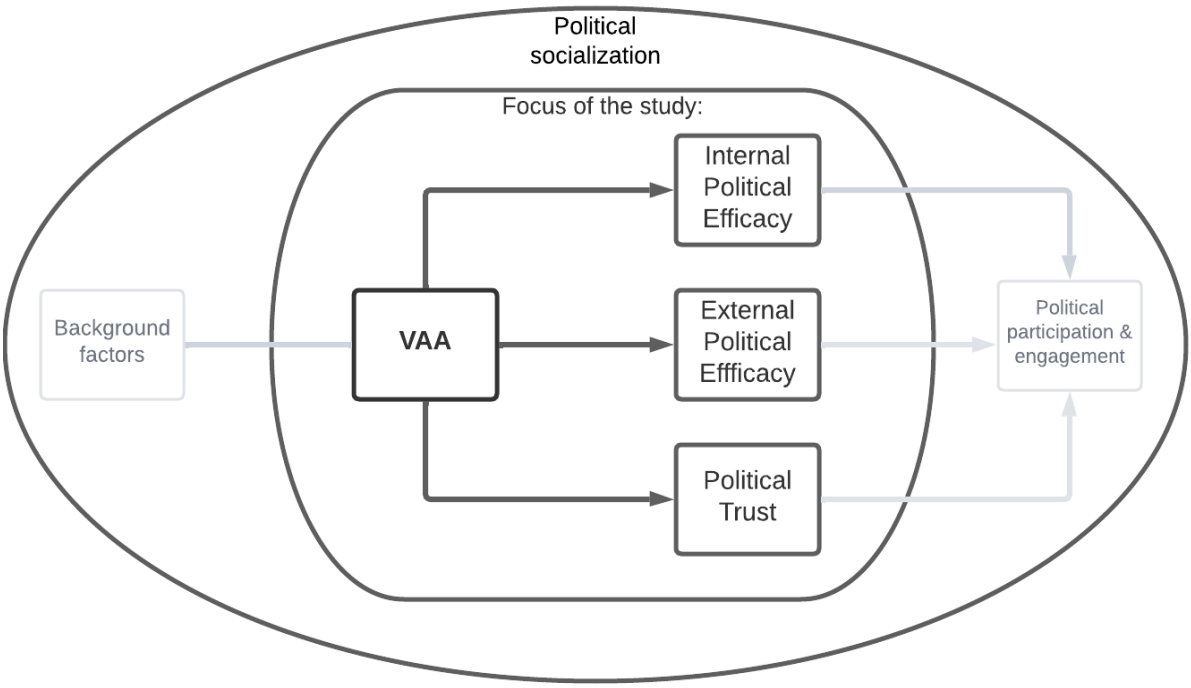
On this account, this work offers the first empirical investigation into the VAAs' effects on pre-voters aged between 16 and 18. We set up an experiment in the classroom that involves a Voting Advice Application, i.e., the *Test électoral éducatif*. We investigate VAA use as an independent variable (IV), and its effects on three dependent variables (DVs), namely, internal political efficacy (IPE), external political efficacy (EPE), and political trust. These three factors are intertwined, forming a foundation from which citizens engage in the realm of politics (see, for instance, Anderson, 2010; Craig, 1979; Craig et al., 1990; Sharoni, 2012; Tzankova et al., 2020; Verba et al., 1995). As citizens feel they can understand politics, make a difference in the political landscape, and trust political institutions to perform their duties, they are keen to actively participate in politics. In other words, if one feels politically efficacious and trustful toward political institutions, one is likely to become engaged in democratic processes. To maintain and strengthen healthy democratic institutions, it is therefore a major challenge to foster citizens' enduring sense of political efficacy and trust. This dissertation hence examines the impact of VAAs on pre-voters' sense of IPE, EPE, and political trust.

The research question that guides the study is: **To what extent do VAAs have an impact on pre-voters' political efficacy and trust? (RQ1)** As the present research also aims to disentangle the mechanisms of VAA effects, we formulate three sets of hypotheses for each DV: the statement, advice, and match effect hypotheses. The statement effect – the effect resulting from simple exposure to VAA statements; the advice effect – the effect resulting from receiving voting advice related to VAA use; and the match effect – the effect resulting from matching the advice with the user's prior party preferences. In addition, we wonder whether the VAA effects last in time, about one month after VAA use, and ask: **To what extent does a VAA have a lasting impact on pre-voters' political efficacy and trust? (RQ2).** Lastly, individuals with a low socio-economic status (SES) are likely to have fewer political resources and limited political influence (Burns et al., 2001; Verba et al., 1995). Therefore, addressing inequalities in political attitudes is essential for promoting equal political participation and representation in society. We aim to investigate the extent to which the application addresses the unequal distribution of political resources that arise from individuals' socio-economic backgrounds. To do so, we investigate VAA-differentiated effects based on SES. Hence, we ask the following sub-question: **To what extent is there a difference in VAA effect across different SES levels? (RQ3).**

Figure 2, below, sketches the theoretical framework of the question of interest (We extensively discuss the theoretical framework of this research in Chapter Two). We start from the premise that socio-demographic, political attributes, and socialization factors (illustrated as background factors in the figure below) such as one's gender, SES, political interest, or political

discussion, to name a few, underlie one's political efficacy and trust. It must be noted that the same background factors are found to determine VAA use. VAAs are freely available online during election campaigns and usually attract, to a large degree, citizens with an already high interest in politics. The typical VAA user has a profile similar to the average Internet user: young, man, higher educated, and with an above-average income (Fivaz & Nadig, 2010).

Figure 2. Theoretical Framework



Note: Author's own elaboration.

In turn, the three political attitudes under study have major implications for long-term political participation and engagement. The literature acknowledges that citizens must perceive that they have the skill to engage with politics (IPE), believe that representatives listen to them (EPE), and trust political institutions to act for the common good (political trust) (Norris, 2002; Verba et al., 1995, see Chapter Two, Section 2.2. for further details). The light-colored arrows in Figure 2 above illustrate these relationships. In this way, we emphasize the democratic significance of developing these three political attitudes. This being acknowledged, my empirical analyses focus on the central part of Figure 2, namely the paths that connect VAAs to IPE, EPE, and trust. VAAs might open new digital media opportunities for developing youth political attitudes. It is expected that using a VAA facilitates understanding political issues and party politics, which in turn cognitively engages users to reflect on their own ability to understand politics (IPE), representatives' responsiveness (EPE), and their satisfaction with political institutions (political trust).

To set clear delimitations for the scope of this dissertation, it is important to clarify the conceptual framework of this research upfront. First and foremost, our study refers to the concept of pre-voters. Research on youth and political socialization highlights that the period between the ages of 16 and 18 is key to the development of political attitudes: During this period leading up to the legal voting age, adolescents create their own opinion, are no longer as sensitive to the opinions of their friends, and will soon have to vote (Quintelier, 2008; Stiers, Hooghe & Dassonneville, 2020). In the remainder of this dissertation, we will refer to this category of the population as pre-voters, as a shorthand to express the category of citizens just below the legal voting age (pre-voting age adolescents). Developmental studies demonstrated that individuals are highly susceptible to political attitude change during late adolescence and that these structures tend to crystallize by the time an individual reaches adulthood (Alwin & Krosnick, 1991; Galston, 2001; Hooghe & Wilkenfeld, 2008; Krosnick & Alwin, 1989; Nie et al., 1996; Niemi & Hepburn, 1995 ; Rekker et al., 2017). To target pre-voters is thus critical for initiating individuals into habits of political engagement (Galston, 2001; Sapiro, 2004). To make politics appealing to citizens at a young age is determining for their engagement in the long run, and thus for the future vitality of democracy.

Our research relies on three dependent variables: Internal political efficacy, external political efficacy, and political trust. Internal political efficacy (IPE) is a self-reported evaluation of one's competence, knowledge, and ability to participate effectively in politics (Craig et al., 1990). In that way, it differs from external political efficacy (EPE), which concerns the way citizens perceive the responsiveness of political bodies and actors to citizens' demands (Balch, 1974; Borgonovi & Pokropek, 2017). And last, political trust, or more precisely trust in the political institutions in our case, captures constituents' perception of political institutions' legitimacy (Mishler & Rose, 2001). We will further develop the conceptualization of the DVs in the following chapter (see Section 2.2 from Chapter Two).

The independent variable we scrutinize is the use of Voting Advice Applications (VAAs), which link voters' preferences to parties' policy proposals. These tools then highlight the proximity between the user and the available political parties (Walgrave et al., 2009). In practice, users fill in an online survey according to their opinions on a set of issues (e.g., important political decisions must be left to the citizens through referenda, it must be easier to dismiss workers, etc.). Although different in some aspects, Voting Advice Applications share a common operating principle: The applications compare voters' positions on policy issues with those of political parties, and they generate voting suggestions (Cedroni & Garzia, 2010; Garzia & Marschall, 2012, 2019). Beyond these conceptual considerations, we also must shed light on the context in which this study takes place in the following section.

1.2. Case Background

For a better understanding of the research findings, and to provide guidance on the interpretation of the results presented in the empirical chapters (i.e., Chapters 4 to 6), it appears essential to present some elements related to the context of the present study, which takes place in secondary school classes in the five Walloon provinces. The environment and context one grows up in are determinants for the development of one's political attitudes. In the present section, we first present three determining political environment factors for the Belgian context, i.e., party system, compulsory voting, and legal voting age. Then, we turn to education policies in francophone Belgium in terms of citizenship education. And last, we provide a brief overview of the set-up of VAAs in Belgium.

First, the structure of party systems in which a child grows up has a determining effect for the way they acquire partisanship or ideological position that sets the foundations of their political identity (Percheron & Jennings, 1981; Sapiro, 2004). Hence, the characteristics of the party systems are likely to shape young people's basic conceptions of politics as ideological and/or party labels might serve as central, everyday political concepts. Our study took place in Wallonia, Belgium, a rather complex democracy. Belgium is a multiparty system (Swenden et al., 2006) and has a fragmented party system which provides the voters political parties with strong ideological profiles (Boonen et al., 2014). In 2019, a total of 12 parties were elected in the federal parliament. Indeed, voters have to perform a rather heavy duty in choosing among a wide variety of parties. In this context, VAAs are even more relevant to guide voters in their decisions. Furthermore, federal Belgium comprises two distinct party systems, one in Flanders and one in Wallonia (Swenden et al., 2006). Elected parties must work in a coalition government.

Second, in Belgium, voters are obliged to show up at the ballot box due to compulsory voting laws. It takes no forethought and initiative to register to vote. A citizen is required to vote beginning with the first election after reaching the legal voting age. Such a system has an influence on voting behavior, as abstaining is not a valid option, and in that case, voters are likely to be deliberately inclined towards blank and invalid voting (Hooghe et al., 2011). In addition, even though compulsory voting is hardly enforced in practice, Belgium shows high electoral turnout (Caluwaerts et al., 2022). In the context of compulsory voting, the first priority is to develop citizens' political efficacy and trust in order to enable voters to cast an informed vote.

Third, engaging Belgian youngsters aged 16 and up in politics is a prominent issue, particularly since the establishment of the new Belgian federal government in October 2020.

Lowering the voting age to 16 was one of the key objectives of Alexander De Croo's government. Indeed, the government has decided to grant the right to vote to 16-year-olds during the 2024 European elections. Evidence indeed shows that teenagers from age 16 turn out to be just as capable as adults to cast an "ideologically congruent" vote (Stiers, Hooghe & Goubin, 2020). This new establishment hence constitutes further argument to promote youth political empowerment.

Furthermore, since 2017, Belgium's French community has been organizing for education in philosophy and citizenship (*Communauté française de Belgique*).[1] It is therefore expected that all schools will participate in the acquisition of a range of skills related to citizenship. For the purposes of engaging youngsters in politics, school is a socialization arena of particular interest in reaching pre-voters en masse. School is a meaningful agent of socialization and education for youths in general, and especially for pupils from economically and/or socio-culturally disadvantaged families (Quintelier, 2008). The "Missions" decree, adopted in 1997 and defining the priority missions of basic and secondary education, sets active citizenship and equal opportunities as cornerstones for school education in the French community of Belgium. The third paragraph of Article 6, (Décret "Missions", 1997) provides that: "The French Community, for the education it organizes, and any organizing authority,[2] for subsidized education, shall fulfill simultaneously and without hierarchy the following priority missions: […]to prepare all students to be responsible citizens, capable of contributing to the development of a democratic, caring, and pluralistic society open to other cultures".[3]

As a last background element for the Belgian context, it has to be noted that the use of VAAs is widespread, especially in the Flemish region, where a VAA has been established since 1999 (Uyttendaele et al., 2020; Walgrave et al., 2008, see also Figure 2 above). The francophone version of this VAA, i.e., *Test électoral*, was first launched in 2014. The *Test électoral/Stemtest* is the fruit of a collaboration between journalists and scholars from the University of Antwerp and

[1] Education in Belgium is regulated by the three federated communities (French, Flemish and German-speaking). Belgium has thus three autonomous education systems.

[2] The organizing authority – *pouvoir orgnisateur* – (natural or legal person, public or private) is the authority responsible for the educational activities carried out in one or more schools for which they have a large organizational autonomy.

[3] Original version : Article 6. – La Communauté française, pour l'enseignement qu'elle organise, et tout pouvoir organisateur, pour l'enseignement subventionné, remplissent simultanément et sans hiérarchie les missions prioritaires suivantes :

1° promouvoir la confiance en soi et le développement de la personne de chacun des élèves;

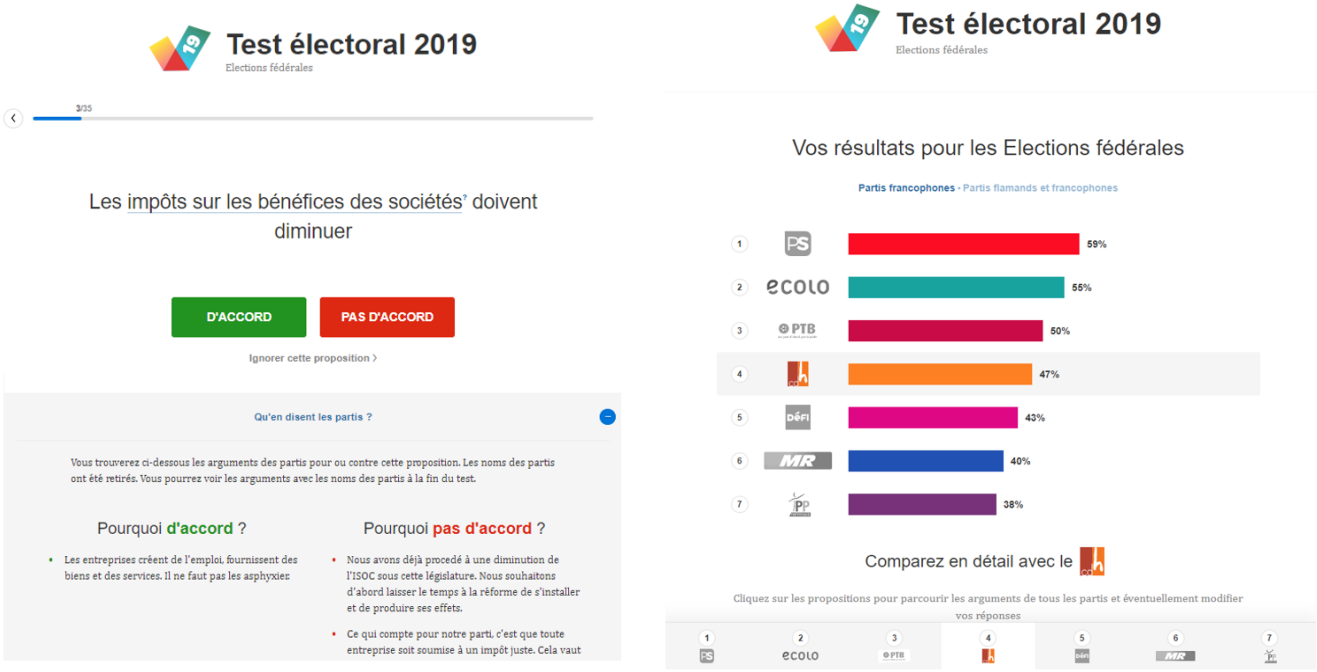
2° amener tous les élèves à s'approprier des savoirs et à acquérir des compétences qui les rendent aptes à apprendre toute leur vie et à prendre une place active dans la vie économique, sociale et culturelle;

3° préparer tous les élèves à être des citoyens responsables, capables de contribuer au développement d'une société démocratique, solidaire, pluraliste et ouverte aux autres cultures;

4° assurer à tous les élèves des chances égales d'émancipation sociale.

UCLouvain. In the 2019 version of the Belgian VAA for the federal elections, users answered a set of 35 policy statements, as illustrated in Figure 3a below. The VAA compares and measures the alignment between users' political beliefs and those of political parties. As a result, users receive voting advice in the form of a ranking in ideological proximity order, as illustrated in Figure 3b. In addition, it must be noted that the *Test électoral éducatif* consists of the same content as the *Test électoral* available during the 2019 election campaign. Further information on the methodology of the Belgian VAA is provided in the appendix.

Figure 3. Sample VAA Screen Pages: (a) Statement 3/35 Screen Page (b) Results Page



(a) (b)

Furthermore, compared to research conducted with adult users, our study on VAA effects among young users has added value to measuring genuine VAA effects. It is acknowledged that some adult users enjoy deceiving the algorithm, as they try to align their answers with the supposed views of their preferred party in order to obtain voting advice that matches their partisan preferences. In that sense, users are motivated to adopt such a strategy to try to avoid cognitive dissonance and lose face when confronted with information that goes against their beliefs. Hence, voters who bypass a VAA do not expose themselves to the real picture of their political self-portrait. Unlike adult users, who are more familiar with the realm of party politics, young people, who have little political experience, are unlikely to bypass the VAA. They are expected to provide answers to VAA statements in an honest and non-deceptive way. Therefore, they tend to obtain voting advice that matches their genuine opinions, since they are too unaware of parties' viewpoints to strategically respond to the VAA statements. The VAA output young users are exposed to is

thus genuine compared to adult users, who might seek schemed voting advice. Research led with less politically sophisticated users hence produces more reliable results to draw conclusions on VAA advice and match effects.

In that sense, our research aims at making generalization claims. The experimental setting is aimed at producing generalizable knowledge. When designing this study, we took special care in balancing the internal and external validity out, so we can draw a confident conclusion on the IV influence on the DV changes, as well as the relevance of the findings to other situations and populations. The Walloon case is relevant in addressing our research objectives considering its characteristics we just developed (i.e., multiparty system, compulsory voting, legal voting age, citizenship education, and widespread use of VAAs) but also considering the easy access to data. The findings bring theoretical and practical implications to other similar settings or contexts. Yet some contextual factors may restrict the generalizability of the findings. We identify some regional idiosyncrasies, such as the absence of elected far-right parties, unlike in many European democracies. In addition, the unique circumstances and unprecedented context of the COVID-19 crisis may not be representative of normal or typical conditions, which can affect the applicability of the findings to non-pandemic situations. Yet the findings can contribute to broader theoretical frameworks and offer comparative insights. In Chapter 7, we present the specific contributions made to furthering academic knowledge on behalf of the research findings, as a conclusion of the present thesis.

1.3. Structure of the Thesis

This doctoral thesis is organized as follows. In the present chapter, i.e., Chapter One: General Introduction, we succinctly set up the research topic. Then, we turn to Chapter Two concerning the theoretical framework of this research. First, we proceed with scrutinizing the groundwork for the dependent variables at stake: political efficacy and trust. The next section sets the baselines of this research as regards political socialization in a broader context. We address the political socialization processes at play among the population of interest in this dissertation, i.e., pre-voters. We also link the concept of political socialization with citizenship education. In the following section of this literature review, we discuss the literature on the topic of VAA design and effects. This section covers the emergence and rise of such tools as campaign information and education tools. Therefore, to close this section, we develop the research gaps identified in the existing literature on VAA effects (lack of controlled experimental studies, self-selection bias, and

lack of research investigating VAA usage outside election campaigns, to name a few). Lastly in this chapter, we develop our research questions and hypotheses.

Chapter Three: Research Design & Methodology presents the methodological framework of this research. The final sample of the study involves 401 pupils from 38 different classes within 17 schools in Wallonia. Section 3.2 considers the data collection approach. First, we provide a description of the sample, the sampling strategies as well as an overview of the location and timescale of the study. Second, the experimental setup and instruments are outlined. Section 3.3 discusses data material and measurements. Each of the dependent variables (i.e., internal and external political efficacy and political trust) and independent variables (i.e., statement, advice, and activating or (in)congruent advice exposure) are defined and described. We then go on to review the manipulation checks' strategies that were used in this study. Section 3.4 is concerned with the data analysis procedures. The validity of the VAA for pre-voters' use is outlined in Section 3.5. We conclude this chapter by reviewing and discussing the inherent biases and limitations of our research goals.

Chapters Four to Six cover the empirical part of this research. In Chapter Four, we investigate the relationship between VAA statement as an IV and our three DVs. Chapter Five is the second empirical chapter. We examine the second set of hypotheses on the relationship between VAA advice as an IV and our three DVs. Chapter Six is the third and last empirical chapter. We consider the last type of VAA effect, i.e., match effect, on our three DVs.

The seventh chapter is concerned with the general conclusion of the thesis. We synthesize the main findings of this research. We reflect on the limitations of this study, and what these suggest for further research. And last, we outline the theoretical, normative, and practical contributions of this research.

Chapter Two: Literature Review & Hypotheses Development

2.1. Introduction

The present chapter reviews the literature that this dissertation builds upon. This research crosses literature on political efficacy, trust, and youth socialization within the framework of the use of Voting Advice Applications (VAAs). This dissertation can be more broadly contextualized within the field of political socialization. First, we delve into the literature investigating political efficacy and political trust, i.e., the dependent variables we focus on. Then, we acknowledge the political socialization processes at stake in the acquisition of political attitudes. Next, we turn to the literature on Voting Advice Applications, their design, and their effects. Over the course of this literature review, we pinpoint concepts relevant to the research but also identify gaps that emerge from our exploration of the existing literature. Lastly, we propose research questions and hypotheses that arise from the literature review.

We aim to contribute to the literature on political attitudes, political socialization, and Voting Advice Applications by providing empirical evidence on the VAA effects mechanisms on pre-voters' political attitudes. My dissertation provides the theoretical framework illustrated in Figure 2, as discussed in Chapter One. The literature has extensively discussed the relationships between demographic, political, and classroom factors (illustrated as background factors in Figure 2) with political efficacy and trust. In turn, IPE, EPE, and political trust are found to be cornerstones of citizens' political engagement. This being acknowledged, my empirical analyses focus on the central part of Figure 2, namely the paths that connect VAAs to IPE, EPE, and trust. VAAs might open new digital media opportunities for developing youths' political attitudes. Yet, it is acknowledged that citizens who visit VAA websites are those who tend to possess a higher education background and political interest (see Section 2.4 for discussion). These socio-demographic background factors are also linked with political efficacy and trust. We assume that implementing a VAA intervention might build up youths' sense of political efficacy and trust to make up for the disparities across the population based on their socio-demographic background.

2.2. Political Efficacy and Trust

The current study contributes to the field by addressing previously neglected effects of VAAs on political attitudes. In this dissertation, we investigate three dependent variables: IPE, EPE, and political trust. IPE is linked with citizens' sense of political effectiveness while EPE relates to their sense of opportunity to perform political action (Craig, 1979). Citizens' trust in political institutions captures their perception of the fairness of political procedures and trustworthiness of the elites and representatives to perform their political duties (Craig et al., 1990). In that sense, citizens' levels of political efficacy and trust reveal how well a democracy is functioning.

In the first instance, citizens must be knowledgeable, feel skilled, and become empowered to take meaningful political actions in order for democracies to function effectively (Campbell et al., 1954; Coleman & Davis, 1976; Craig et al., 1990). These feelings are captured by the concept of internal political efficacy. As a second ingredient of political engagement, citizens must perceive that political elites are responsive to their claims, and that the system allows them to put their political skills into practice (Borgonovi & Pokropek, 2017; Davis, 2014; Lau & Redlawsk, 2006). This is captured by the concept of external political efficacy. Citizens must have confidence in their intrinsic capacity to participate in politics before they will do so. They must also recognize that the political system offers extrinsic incentives for them to take part in it. And, they must trust in their relationship with political institutions, and that they can legitimately take decisions for the common good even though they sometimes disagree (Arnesen & Peters, 2018; Dalton, 2004; Craig et al., 1990; Marien & Hooghe, 2011); this last element is captured in the concept of political trust.

In Section 2.2.1, we carefully disentangle and define both aspects of political efficacy. Then we turn to political efficacy development processes among young individuals. We also look at the political implications deriving from political efficacy. In the same way, in Section 2.2.2, we look into the definition of political trust in the current literature, and we reflect upon its meaning for democracy. We also assess the framework of political trust development. We conclude the present chapter by sketching the implications of political efficacy and trust for citizens' participation and democracy in the framework of political culture theory in Section 2.2.3.

2.2.1. Political Efficacy

Scholars often recourse to the concept of political efficacy to understand the dynamics behind the issues of political alienation or disinterest. One's sense of political efficacy expresses the extent to which one feels competent to understand politics, and capable of making a difference in the political arena (Niemi et al., 1991). Since the 1950s, political efficacy is defined as "the feeling that individual political action does have or can have an impact upon the political process, i.e., that it is worthwhile to perform one's civic duties. It is the feeling that political and social change is possible, and that the individual citizen can play a part in bringing about this change" (Campbell et al., 1954, p. 187). It is therefore a subjective and psychological construct that predicts political engagement (Craig & Maggiotto, 1982). Taking the perspective offered by psychology, political scientists also recourse to the term 'political self-efficacy' to describe political efficacy (see for instance, Madsen, 1987; Quintelier & Hooghe, 2013). With the concept of self-efficacy, psychologists focus on the individual's perception of themself. Perceived self-efficacy is concerned with judgments of how well one can execute courses of action required to deal with prospective situations or tasks (Bandura, 1982). It pertains to one's perception of their own role in the larger political environment (Bene, 2020).

Two dimensions generally capture the concept of political efficacy (Balch, 1974; Lane, 1959; Niemi et al., 1991). Political efficacy combines the image of the self and the image of democratic government (Lane, 1959). Balch (1974) later referred to subjective competence and system responsiveness to capture the conceptual partition. In the more recent literature, it is acceptable to refer to the constructs of internal political efficacy and external political efficacy to apprehend the two components of political efficacy (Saris, 2014). This conceptual partition suggests different implications resulting from people's beliefs that they can play an active role in changing society, on the one hand, and that the system reacts to these actions in a positive way, on the other hand (Saris, 2014; Verba et al., 1995).

IPE is a self-reported evaluation of one's competence, knowledge, and ability to participate effectively in politics (Craig et al., 1990) – e.g., to take part in an election as a candidate, to feel one has a good understanding of political issues, etc. (Karp & Banducci, 2008; Niemi et al., 1991, p. 191). IPE relates to attributes such as individuals' self-confidence, political knowledge, and expressive skills, to believe themselves capable of inducing political action or change (Coleman & Davis, 1976). Without a feeling of internal efficacy, people are therefore likely to become disengaged from political action and democratic processes. The nomenclature 'internal political

efficacy' reached consensus among social scientists (Karp & Banducci, 2008; Niemi et al., 1991; Saris, 2014) but the terms self-capacities (Bene, 2020), personal political efficacy (Coleman & Davis, 1976), or subjective competence (as raised by Balch, 1974) are sometimes used.

In that way, IPE differs from EPE, which concerns citizens' perception of the responsiveness of political bodies and actors to their demands (Balch, 1974; Borgonovi & Pokropek, 2017). EPE does not only capture citizens' beliefs in the effectiveness of the institutions to meet their needs or consider their concerns, but also their perception of the system's openness to their attempts to take political action. This construct touches upon the capacity of and the success with which an electoral system responds to public preferences (Davis, 2014). Then a low level of external efficacy indicates apathy towards politics and a feeling of being misrepresented (Niemi et al., 1991). Conversely, when the citizens' sense of external efficacy increases, the democratic deficit decreases – particularly considering that democracy succeeds when government, in some broad sense, represents the will of the people (Lau & Redlawsk, 2006). EPE thus provides a barometer of a democracy's health (Davis, 2014).

These two dimensions are related yet distinct from each other. An individual who feels politically competent and capable of grasping political issues, and who therefore demonstrates a high level of IPE, may nevertheless perceive that the political system leaves people like them behind, and hence demonstrates a low level of EPE. The same individual may, on the one hand, be holding the cognitive and motivational resources to grasp politics, but on the other hand, be convinced that elected representatives have little or no consideration for their demands (because, for example, the elected officials' priority and attention lie elsewhere) (Verba et al., 1995). Citizens must be knowledgeable, but they also have to show willingness to mobilize knowledge and information to engage in meaningful political action. Such willingness largely depends on their perceptions of political institutions' responsiveness (Borgonovi & Pokropek, 2017).

In that sense, political efficacy is viewed as a key factor for developing and sustaining successful democratic systems (Almond & Verba, 1963; Borgonovi & Pokropek, 2017). Becoming and feeling politically efficacious have different meanings for individuals and far-reaching implications for democracy. On this premise, cognitive development research has expended a lot of effort to look at how political efficacy develops among youths at the individual level. In that respect, political science has investigated its effect on political participation and engagement at a societal level.

One of the most consistent findings on political efficacy development is that once individuals gain political efficacy, they are likely to keep it in the longer run (Beaumont, 2010; Pasek et al., 2008). Research has identified demographic differences in political efficacy (Beaumont, 2010; Levy & Akiva, 2019; Sharoni, 2012). Gender, socioeconomic status, and educational background stratify an individual's level of political efficacy. In addition, it is widely acknowledged that school and civic education programs are one of the main gateways to political efficacy (Beaumont, 2010; Sohl, 2014). Political information within school curricula is likely to enhance adolescents' understanding of the functioning of democracy, and in turn their democratic attitudes (Marien, 2017), but also create a sense of IPE. However, scholars advocate for more than superficial textbook experiences to foster political efficacy. Researchers have extensively examined the above-mentioned relationships between demographic, political, and classroom factors with political efficacy. On top of that, our research aims to explore the question of the influence of issue congruence information on pre-voters' political efficacy. This kind of information may provide young people with the tools needed with respect to their ability to understand and participate in politics, and to feel as such (Pasek et al., 2008). Therefore, this study examines the influence of VAA information on pre-voters' political efficacy. We further develop our hypotheses in the last section of the present chapter (Section 2.5, 'Research Questions and Hypotheses').

The main argument for promoting political efficacy lies in its effect on political participation and engagement. The substantial acknowledgment of the importance of political efficacy to democracy has contributed to the recent revitalization of scholarly interest in this phenomenon. Since the 1950s, the literature has consistently referred to political efficacy as a twofold concept: it captures the feelings of political competence (internal political efficacy) and worthiness to engage in politics (external political efficacy) (Campbell et al., 1954; Morrell, 2003). Scholars turn to this construct to explain political engagement rather than only resorting to the concepts of political interest or knowledge. Where the latter has shown their explanatory limits, political efficacy offers greater insight into the motivational mechanisms at play to understand citizens' inclination to take political action, as it captures their beliefs about their capacity to make a difference in the political realm. In the sense that political efficacy facilitates the transformation of psychological engagement into political action, it works as an impetus for political participation (Levy & Akiva, 2019; Sohl, 2014).

Political efficacy is thus recognized as a powerful catalyst for political participation. This aspect notwithstanding, it is not widely studied as a dependent variable. The effects of political efficacy on political participation and democratic systems have been extensively examined.

However, the mechanisms behind the construction of political efficacy remain a puzzling question. It is widely recognized that socialization agents play an important role in young people's political attitude development (see Section 2.3, 'Political Socialization Processes' below) but the processes for education to translate into actual political efficacy beliefs remain a moot point.

2.2.2. Political Trust

The third dependent variable we address is political trust. Citizens' political trust expresses their support for their representatives and political institutions (Bianco, 1994). In that way, political trust, or more precisely trust in the political institutions in our case, captures constituents' perception of the legitimacy of political institutions (Mishler & Rose, 2001). Citizens' trust in political institutions captures their perception of the fairness of political procedures and the trustworthiness of the elites and representatives to perform their political duties (Craig et al., 1990). When citizens are asked about their political trust, they ask themselves about their relationship with its institutions (Balme et al., 2003). Citizens hold trusting relations with governments and representatives as they perceive that they act for the common good (Arnesen & Peters, 2018; Dalton, 2004). Trusting citizens are those who perceive public rulers' decisions as being legitimate, even though these decisions sometimes go against their own particular interests (Marien & Hooghe, 2011). A growing number of voters feel a gap between their expectations and actual institutional performances, resulting in political distrust or mistrust (Citrin & Stoker, 2018; Grönlund & Setälä, 2007). Distrust reflects a belief that the other is untrustworthy, while mistrust reflects doubt or skepticism about the trustworthiness of the other (Citrin & Stoker, 2018). Some might feel that their preferences and opinions are not adequately reflected by political institutions such as parliament, government, or political parties. Conversely, some others assume the reliability of the institutions, have diffuse expectations of appropriate conduct, and believe that they will act "as they should" (Robinson et al., 1999). Citizens' political trust involves that they acknowledge the legitimacy of the political institutions; in turn, they are willing to accept the decisions of politicians or authorities (Hooghe & Zmerli, 2011; Marien & Hooghe, 2011). When one trusts, one is accepting vulnerability to the possibility of betrayal or failure (Citrin & Stoker, 2018).

The literature reveals two currents of thought as regards the origins of one's political trust. From the institutional theories' perspective, on the one hand, political trust is politically endogenous. Trust in political institutions is rationally based as citizens make an appraisal of institutions' performance (Mishler & Rose, 2001). In this case, one could assume that young individuals and those who have very little first-hand political experience cannot develop political

trust (Hooghe & Zmerli, 2011). Cultural theories, on the other hand, advocate that trust in political institutions originates from factors exogenous to the political sphere, such as cultural and social norms. Political trust is viewed as an extension of interpersonal trust that is projected onto political institutions (Mishler & Rose, 2001). In that sense, early socialization experiences are critical to political trust development, as interpersonal trust is learned early in life and trust is rather stable over a lifetime. Political trust is thus one of those stable attitudes that can be developed during adolescence (Hooghe & Wilkenfeld, 2008; Uslaner, 2002). Moreover, experiential theories of trust advocate that trust is strongly influenced by personal experiences regarding political institutions or actors. These experiences can spill over to generalized political trust judgments (Bowler & Karp, 2004; Sønderskov & Dinesen, 2016). Information about single group members can be abstracted, generalized, and used as heuristics for group judgments. Political trust reflects current experiences with politicians, and is changeable (statelike) through information on that individual politician. These two theories are not exclusive and are even complementary. Socialization (further developed in Section 2.3, 'Political Socialization Processes') and institutional performance exert reinforcing effects on trust in institutions.

Political trust has major implications for the effectiveness and stability of democratic systems. Citizens' political trust affects political participation, their compliance with the law, and more broadly, the legitimacy of political systems. First, it is one of the predictors of civic participation and engagement (Campbell, 2009). Political trust increases the likelihood of voting (Grönlund & Setälä, 2007); this issue is particularly sensitive in countries where voting is not compulsory. In their review of political trust, Citrin & Stoker (2018) acknowledge competing expectations regarding the ways in which political trust affects participation. They state that, "On the one hand, trust could be a sentiment of civic affirmation that inspires political engagement […]. On the other hand, the trusting may be satisfied with government and view it as needing little monitoring, so trust could weaken the impulse to participate in politics" (Citrin & Stoker, 2018, p. 64).

Second, political trust also affects compliance with the law. On the one hand, distrustful citizens are less likely to support policies that entail personal risk or sacrifice (Citrin & Stoker, 2018). They are also more inclined to cheat on or avoid paying taxes (Zorell & van Deth, 2020) and to falsely claim state benefits (Marien & Hooghe, 2011). On the other hand, trustful citizens are more willing to accept the decisions of politicians or authorities (Hooghe & Zmerli, 2011; Marien & Hooghe, 2011).

All in all, citizens' sense of political trust is an indicator of the legitimacy of the political institutions, and more broadly, of democratic political systems. Citizens' sense of political trust captures their perception of the fairness of political procedures, and the trustworthiness of the elites and representatives to perform their political duties (Craig et al., 1990). In that sense, the legitimacy of democratic political systems highly depends on the extent to which constituents trust the institutions to do what is right (Easton, 1965). However, critical citizens are not necessarily distrusting citizens (Hooghe & Zmerli, 2011). Political trust, understood as citizens' confidence in political institutions, is an ambivalent concept (Catterberg & Moreno, 2005). Both distrust and trust in political institutions can be seen as beneficial to a healthy representative democracy (Newton, 2001). Citizenry distrust might be the reflection of a critical outlook towards political institution (Hooghe & Zmerli, 2011) meaning that citizens do not place blind faith in their trustees. Rather than evidence of a critical citizenry, the erosion of political trust is also closely linked to disillusionment and disaffection (Catterberg & Moreno, 2005). Nevertheless, as citizens show a high level of political trust, this indicates that they perceive their country as being run for the benefit of all the people. Citizens' trust in the political institutions is their expression of positive feeling toward public authority (Catterberg & Moreno 2005; Sharoni 2012).

2.2.3. The Framework of the Psychological Engagement Model

We can find some conceptual similarities between political trust and political efficacy constructs. Craig (1979) links IPE with citizens' political effectiveness, EPE with their opportunity for action, and political trust with their evaluation of the outcomes of such actions. The last two elements may appear difficult to differentiate, as they both implicitly pertain to the notion of institutional responsiveness (Craig, 1979). The two concepts of EPE and political trust overlap but it is theoretically critical to disambiguate the two to assess whether participation means an individual appeal (Sharoni, 2012). Political trust captures anticipated outputs on which political actors are generally evaluated. EPE expresses the degree to which elites respond to citizens' demands (output efficacy). They both refer to citizens' evaluation of institutions' performance. EPE evaluates institutions' responsiveness to citizens' political action or claims. Political trust is citizens' evaluation of political institutions's efficacy in taking action for the common good.

In that sense, the subjects being assessed by citizens, as measured in EPE and political trust, differ. EPE refers to the actual responsiveness of incumbents, whereas political trust requires more abstract reasoning on institutional politics. EPE deals with citizens' feelings and expectations about the window of opportunity that the authorities provide them to contribute to political life. It is

captured, for instance, by citizens' perceptions of the government's responsiveness, attention to citizens' demands, or care for people's opinions. Trust rather pertains to the window of opportunity that a citizen is willing to give to institutions to take political action on their behalf. Those who trust and support political institutions are those who believe that authorities effectively serve the broad public interest and generally "do what is right" (Craig et al., 1990).

Some argue that EPE is a building block of political trust (Craig, 1979). This assumption about the relationship between political efficacy and trust may, however, not be correct for all cases. Some others argue that political efficacy and trust work concomitantly, and that both are prerequisites for citizens to engage with politics (Anderson, 2010): they must believe that their involvement in politics will be consequential (political efficacy), and they must trust that the behaviors of constituents will be honorable (political trust). In the opinion of some citizens, the right thing for incumbents to do is to show responsiveness to popular demand. In that way, in order to maintain a relationship of trust, the authorities are expected to be responsive to citizens' actions. Others place their trust in institutions without necessarily feeling the need to take citizen actions. In this sense, the legitimacy of institutions depends on their responsiveness, for some; others grant this legitimacy to someone who will decide, without feeling the urge to act or monitor their decisions.

Therefore, the three constructs of interest in the present thesis offer a comprehensive approach that encompasses citizens' psychological engagement toward politics. Citizens must perceive that they have the skill to engage with politics (IPE), believe that representatives listen to them (EPE), and trust political institutions to act for the common good (political trust). Verba, Schlozman & Brady (1995) introduced the Civic Voluntarism Model to connect a variety of participatory factors to citizens' involvement in politics. They identify three sets of factors that facilitate political participation: individuals' psychological engagement in politics, their resources, and their location in networks of recruitment and mobilization (Verba et al., 1995). They demonstrate that a lack of psychological engagement, resources, and social networks may hinder political engagement, as citizens may not participate in politics because they do not want to, because they cannot, and because nobody asked (Verba et al., 1995, p. 269). Verba and colleagues' works provide an understanding of the determinants of citizen participation. The civic voluntarism model thus allows a better grasp of the declining trends in political participation, the extent of inequalities in citizen engagement among different groups of society, and the explanations for these inequalities.

The first set of determinants of the civic voluntarism model forms the Psychological Engagement Model, also called the Political Culture Model (Norris, 2002). They refer to one's orientations towards politics, and explain willingness to participate in political activities. Within this set of factors, scholars have found that political interest, IPE, EPE, and political trust are strongly associated with citizens' participation (see, for instance, Burns et al., 2001; Hetherington, 1998; Hooghe & Marien, 2013). The psychological engagement variables make it possible to illustrate that if one does not have a sense of IPE, EPE, or political trust, it is more likely one will remain out of political activities. Conversely, if one perceives that participation makes a difference, is interested in the topic, and trusts political institutions, one tends to be motivated to be active in politics.

In that sense, political efficacy and trust work inextricably to form a foundation from which citizens engage in the realm of politics. As one feels that one can understand politics, make a difference in the political arena, and trust political institutions to perform their duties, one is keen on actively participating in politics. In other words, as one feels politically efficacious and trustful toward political institutions, one is likely to become engaged in democratic processes. It is therefore a major challenge to foster citizens' enduring sense of political efficacy and trust in order to maintain and strengthen healthy democratic institutions (Borgonovi & Pokropek, 2017).

It should be noted that the variables in the political culture model are also related to context and resources. Verba et al. (1995) demonstrate how these factors derive from socioeconomic status. They explain that the well-educated and economically advantaged are more likely to be more politically skilled, interested, and trustful. Despite this, the authors demonstrate that political engagement variables have a significant impact on political participation after controlling for resources. They elaborate the Resource Model, in which it is argued that personal resources, especially personal or family socioeconomic status (SES), may increase the likelihood of one's political participation. Verba et al. (1995) also identify a range of other resources such as free time and civic skills (e.g., communication skills, cognitive competencies, and organizational abilities) that allow citizens to contribute effectively to political life. Therefore, the Resource Model suggests that cultural capital (social and cultural knowledge, skills, and experiences) and cognitive capital (cognitive abilities and skills, such as critical thinking and decision-making) are important resources that can influence an individual's willingness to engage in civic activities and ability to make informed decisions about how to engage with civic issues (Bourdieu, 1979; Putnam, 2000). Individuals who have more resources available are facilitated to participate in political activities more frequently, and with less effort. Conversely, a lack of resources may greatly decrease one's

levels of participation. Consequently, as there are strong inequalities in terms of resources among citizens, we also observe disparities in terms of political participation.

In addition to the psychological engagement model and resource model, Verba et al. (1995) identify the Social Networks Model as the last component of the civic voluntarism model. The social networks model refers to recruitment and mobilization efforts by friends, relatives, school peers, or acquaintances in one's social environment. It is likely that individuals who experience psychological engagement and have resources might not take part in political activities unless they are asked to by others. In that respect, recruitment can be a key triggering factor for political participation. Recruitment and request for political activity occur in different social settings, such as the workplace, church, voluntary organizations, or school. All of the latter, comprised as institutional involvement, are found to be catalysts for political participation (Burns et al., 2001; Norris, 2002; Verba et al., 1995). People involved in such social networks (where political discussion may take place) are more likely to be targeted by requests for political activity, and in turn to participate in politics. In that sense, when individuals interact with each other in their social networks, they are more likely to develop social capital, which can enhance their ability to participate in civic life (Putnam, 2000). In this way, the social networks model and social capital are closely linked, as social networks can be viewed as means of creating and sustaining social capital.

Hence, the present study mostly engages with the psychological engagement component of the civic voluntarism model. Yet, to answer the "from whom" question of political culture development, we must engage in further literature. In that respect, we use political socialization studies to improve the understanding of political attitudes development through social interaction, and to add to the psychological engagement model.

2.3. Political Socialization Processes

Within the framework of political efficacy and trust development, it is necessary to turn to the field of political socialization to frame this research. The broader context of political socialization is crucial to investigate the development of pre-voters' political attitudes. Political socialization came to be recognized as a subfield within political science in the 1960s. This interdisciplinary field has also gained insights from sociology, as well as developmental and cognitive psychology (Sapiro, 2004). The questions and definitions set decades ago remain relevant. Easton (1968) examines aspects of the socialization of children in the area of politics, and defines political socialization as "those developmental processes through which persons acquire political orientations and patterns of behavior" (Easton, 1968, p. 125; Easton & Dennis, 1969, p. 7).

However, this restrictive definition does not take the nature or source of this acquisition process into account. Political socialization involves social interactions with different agents or institutions. Research refers to five important political socialization agents (or socializing institutions) in Western societies: parents (or family). peers, mass media, voluntary associations, and school (Abendschön, 2013; Quintelier, 2008). Youth are involved daily with these socialization agents as they converse with their parents or friends, attend activities in and after school, or consume media content.

In Section 2.3.1, we tackle the question of political socialization agents, and the ways they contribute to one's socialization dynamics and build up political efficacy and trust. In Section 2.3.2, we explore further developmental studies and impressionable years hypotheses to discuss the formative period of pre-voting age. Finally, in Section 2.3.3, we turn to discuss the various forms of citizenship education and school socialization.

2.3.1. Political Socialization Agents

It has been argued that all five socialization agents overlap in different social contexts; they can be investigated jointly, and in all age groups, or at various developmental stages (Quintelier, 2015; Sapiro, 2004). Political socialization is not limited to childhood and adolescence but rather is a lifelong process (Easton & Dennis, 1969; Ihl, 2002; Neundorf et al., 2017). The capacity for political processing increases progressively with age. However, political socialization is not a linear process, considering that political experiences also increase over the lifespan (Ihl, 2002). The debate continues over which agent is the more influential in one's political socialization process. It is

nonetheless known that the influence of different agents fluctuates over a lifetime (Hyman, 1959; Quintelier, 2013).

First, the early-life importance of parents gradually diminishes as children grow older (Hyman, 1959). Both indirect and direct political socialization take place during childhood. Indirect socialization occurs when parents themselves are actively engaged in politics. By seeing that their parents are taking an active role in politics, children are more likely to become involved in politics at a later age (Jennings & Niemi, 1974). Direct socialization happens as a result of discussing politics with parents. There is evidence that pupils discussing politics with their parents tend to feel they have a better grasp of political issues (Almond & Verba, 1963; McIntosh et al., 2007). In-person political discussions with parents contribute to reducing adolescents' feelings of political alienation in the sense that they feel more able to influence politics (Gniewosz et al., 2009). Pupils who have discussions on political issues with their parents also appear to be more trusting of political institutions (Gniewosz et al., 2009; Newton, 2001). From age 16, parental and familial influence is found to be much smaller than the effect of other agents (Quintelier, 2015).

Second, peer networks both in and out-of school also influence knowledge, attitudes, and behaviors as interaction with other pupils or young people convey norms and values (Schwarzer & Zeglovits, 2013; Torney-Purta, 2001). Peers are omnipresent in young people's lives. Through their constant interaction, adolescents develop their opinions and political skills (Verba et al., 1995). Peer interaction is found to lead to greater political participation, and to be more influential than family in late adolescence (Quintelier, 2015). To some extent, political discussion in peer networks also functions as a means of recruiting for political activity (Klofstad, 2011).

Third, mass media are also viewed as a major transmitter of political information and knowledge (Delli Carpini & Keeter, 1996). Citizens who keep up with the news are thus exposed to political information, and are more likely to gain political knowledge and engage in political activities (Weaver & Drew, 2001). As regards younger audiences, youth are not simply using the Internet for entertainment, but also for informational purposes. They have indeed turned to new media for news and information. Younger audiences' media consumption habits are diverse: some actively gather information while others simply screen out political news. Young people's online news consumption fosters their political awareness. Young people who read news online tend to keep up with current events. In doing so, they become more capable of engaging in political discourse (Beaumont, 2011). Many studies suggest that young individuals who use online media for political information make gains in political efficacy (Ha et al., 2013; Levy, 2013; Pasek et al.,

2008; Zhou & Pinkleton, 2012). Yet there is also evidence that online news consumption might erode external efficacy (see for instance, Lee, 2006). Political information in the media also includes many criticisms and depreciation of the public sector (Delli Carpini, 2000). Hence, young people who read online news are likely to have a more negative outlook on government and elected officials. Yet others also acknowledge that those who devote attention to political information and news show lower mistrust and cynicism toward political institutions (Ceron, 2015; Claes et al., 2012). Media consumption can build civic knowledge (Bachen et al., 2008), and contributes to a positive appraisal of politics (Dostie-Goulet & Guay, 2014).

Fourth, voluntary associations have long been recognized as offering learning opportunities to develop useful skills for carrying out political activities (Almond & Verba, 1963; Tocqueville, 1951; Verba et al., 1995). Through memberships in voluntary associations (e.g., trade unions, youth organizations, and sports clubs), participants may gain access to public deliberation that stimulates a sense of community. In turn, this may foster a sense of representation (Verba et al., 1995), and an increased participation in politics, and *vice versa*. Among Belgian late adolescents, voluntary associations are found to stimulate political participation the most compared to other agents of political socialization (Quintelier, 2015). Yet, in the short run, involvement with voluntary associations might also dampen political participation; that is, as young people spend more time in associations, they might have less time for other activities such as political ones (Fredricks, 2012).

Lastly, some argue that school is the most influential political socialization agent (Campbell, 2008; Torney-Purta, 2001). School influence on knowledge, attitudes, and behaviors is not only conveyed through interactions with other pupils but also with teachers in the classroom. School also affects pupils' political attitudes through their educational experiences and school climate (Schwarzer & Zeglovits, 2013). Educational experiences have cognitive effects that enable pupils to understand social and political life. The information that is being transmitted to pupils helps them play a meaningful role in political life. Educational experiences increase pupils' knowledge and ability to interpret information about the political system (Hooghe et al., 2015). However, scholars advocate for more than superficial textbook experiences to foster political efficacy and trust. We discuss citizenship education experiences in greater detail in Section 2.3.3. In addition, the school functions as a small-scale society (Claes et al., 2012). In that sense, the school can be regarded as an organic whole instead of a composite of isolated parts, and "the school may be connected with life so that the experience gained by the child in a familiar, commonplace way is carried over and made use of there, and what the child learns in the school is carried back and applied in everyday life" (Dewey, 1916).

These agents and interactions are not the only players involved in one's process of informal political learning. Early life experiences and events also contribute to forming the basis for political attitudes, engagement, and ultimately political behaviors (Neundorf et al., 2017). Young citizens are also socialized into politics through life cycle events (i.e., leaving the parental home, entering the job market, cohabiting, buying a house, or starting a family), or experiences of transformative events (i.e., first voting experience, political scandals, wars, macroeconomic shocks, or critical events such as natural disasters) (Delli Carpini, 2000; Neundorf et al., 2017). These are all political stimuli or signals that affect (young) citizens.

Recent literature has identified several mechanisms and processes involved in the development of individuals' political attitudes (Sapiro, 2004). Since the 1980s, research on youths' political development has acknowledged that children are not the passive recipients of political information they were once thought to be (Sapiro, 2004). Scholars highlight the importance of considering youths' active agency in their own socialization and not only surrounding socializing institutions' influence. They acquire political attitudes and behavior both from others and from individual experiences with politics. The literature does not agree on which institution is the most influential in the political socialization processes (see Quintelier, 2008 for a review).

Agents of socialization, events, and autonomous experiences also apply to the development of political efficacy and trust. These can be promoted through the transmission of parental values, interaction with peers, the media environment, involvement in voluntary associations, and school education (Anderson, 2010; Ceron, 2015). Personal experiences regarding political institutions or actors can also get one to (dis)engage from public life (Bowler & Karp, 2004; Delli Carpini, 2000; Sønderskov & Dinesen, 2016). Early life experiences, events, and socialization are thus critical to political efficacy and trust development, as they are attitudes that can be developed during adolescence (Anderson, 2010).

2.3.2. Pre-Voting Age: A Critical Time for Political Socialization

Studies within political psychology developed the "impressionable years" hypothesis, which states that "individuals are highly susceptible to attitude change during late adolescence and early adulthood and that susceptibility drops precipitously immediately thereafter and remains low throughout the rest of the life cycle" (Alwin & Krosnick, 1991; Krosnick & Alwin, 1989, p. 416; Niemi & Hepburn, 1995). In their study on the stability of political attitudes over the lifespan, Krosnick & Alwin (1989) reveal that the period of maximum attitudinal change runs through late adolescence and early adulthood. Youths' political attitudes and sociopolitical orientations are still being developed. Therefore, we maximize the likelihood of detecting socialization effects, attitudinal development, or change as we study late adolescents (Quintelier & Hooghe, 2012). One's formative years are indeed marked by unprecedented psychological and social change. Besides, as society traditionally expects youth to grow into active citizenry, there are initiatives to formally educate them about citizen participation and politics (Niemi & Hepburn, 1995). The early socialization experiences have been shown to have deterministic power in the formation of political attitudes and identity (Levy & Akiva, 2019; Tzankova et al., 2020). These structures tend to crystallize by the time an individual reaches adulthood, with relatively little change thereafter (Galston, 2001; Hooghe & Wilkenfeld, 2008; Nie et al., 1996; Rekker et al., 2017).

Nonetheless, we identify some gaps as regards the hypotheses on the formative and impressionable years, more specifically about the theoretical framework of learning and developing political attitudes. First, they leave little room for explanations other than political socialization in the development of political attitudes. They overlook the role played by the emergence of new political issues and other events during this critical phase of cognitive maturation. Second, the impressionable years hypothesis presupposes that school education can compensate for lack of resources and political socialization at home. However, numerous studies demonstrated that school education often fails to reduce these inequalities, and to offer equal opportunities for political learning (Bourdieu, 1970; Draelants, 2019). Third, there is no consensus in the literature on precisely which are the impressionable years. Some authors argue it ranges up to ages 18, 25, or even 35.

Yet, research on youth and political socialization highlighted that the period between the ages of 16 and 18 is a key time for the development of political attitudes: During this period just below the legal voting age, adolescents cultivate their opinions, opinions they will soon have to use as voters (Quintelier, 2008; Stiers, Hooghe & Dassonneville, 2020). This category of the population can be defined as pre-voters. They are therefore distinguished from first-time voters, who have

already had the opportunity to express their opinion at the ballot box. To target pre-voters is thus critical for initiating individuals into habits of political engagement (Galston, 2001; Sapiro, 2004). To make politics appealing to citizens at a young age is determining for their engagement in the long run, and thus for the future vitality of democracy.

Aiming our attention at this age group's political development holds particular relevance in Belgium for numerous contextual reasons that we carefully developed in the introductory chapter. The structure of party systems, the number of political parties, their ideological polarization, and coalition building, are characteristics that are likely to determine the age at which individuals develop ideological positions, political orientations, and attitudes (Boonen et al., 2014; Percheron & Jennings, 1981). Last, engaging Belgian youth into politics from age 16 is a prominent issue, particularly since the establishment of the new Belgian federal government in October 2020. Voting at the age of 16 is one of the key objectives of the federal government agreement of Alexander De Croo's team. Indeed, the government has decided to grant the right to vote to teenagers from 16 years old beginning with the 2024 European elections. Evidence from the "voting at 16" initiative in the city of Ghent (Belgium) shows that this age group is just as capable as adults to cast an "ideologically congruent" vote (Stiers, Hooghe & Goubin, 2020).

It has to be noted that there are several categories of pre-voters. Common to them all is that they do not have the right to register on voters' lists yet but are soon to be enfranchised; this includes immigrants in the naturalization process and late adolescents. A few European countries (e.g., in Austria, some Swiss cantons, and German Länders) reserve the so-called pre-majority status for adolescents aged 16 to 18. Notably, this legal status is associated with the right to vote in local elections. One could also use the terms "late adolescents" or "pre-adults" to refer to pre-voting-age adolescents. But here again, there is no universal agreement on the delimitation of adulthood. In the conclusion of the present thesis, we will address how the research findings could apply to other categories of pre-voting populations, such as immigrants, in the process of being granted nationality. Just as with late adolescents, these segments of the population are preparing to become novice voters, and are thus targeted by political education programs.

2.3.3. School Socialization

For the purposes of engaging youngsters into politics, the school is a socialization arena of particular interest for reaching pre-voters en masse. The school is a meaningful agent of socialization and education for youths in general, and especially for pupils from economically and/or socio-culturally disadvantaged families (Quintelier, 2008). The school is purportedly a provider of civic skills and political knowledge, which in turn triggers political participation. Scholars are challenged to provide insight on the question of whether school education is a direct cause of participation, or a proxy for other influences, such as socialization agents or socio-cultural capital (Persson, 2015). However, insights from education science indicate that educational experiences have cognitive effects that enable pupils to understand societal and political life (Galston, 2001). The information that is being transmitted to pupils helps them to play a meaningful role in political life. Education experiences increase pupils' knowledge and ability to interpret information about the political system (Hooghe et al., 2015).

Citizenship education at school can be promoted in many ways. The concept of citizenship education refers to "the knowledge, skills, attitudes and experience to prepare someone to be an active, informed participant in democratic life" (Campbell, 2012, p. 1). Classroom instruction on politics and current societal issues involves knowledge transfer from the teacher to the pupils in the classroom. Through this cognitive-based formal education form, teachers expose their pupils to current societal issues by tackling controversial issues in the classroom (Hahn & Tocci, 1990). Some education systems prioritize direct forms of citizenship education, i.e., instruction about democratic values or the functioning of the political system.

Instruction on current social issues serves the cognitive function of citizenship education (Claes et al., 2012; Dassonneville et al., 2012) aiming to stimulate pupils' political knowledge as an essential feature of responsible citizenship (Claes & Hooghe, 2017). Teachers do not only decide what topic to include or exclude from the classroom agenda, they also set the tone for the classroom interaction dynamics (Blankenship, 1990). A specific role is expected of all stakeholders involved in the classroom: in terms of teacher role expectation, providing guidance and encouragement; and in terms of student participation, discussion, and direct involvement in classroom activities are expected (Blankenship, 1990). The classroom should be a discussion arena between students, and between teachers and students, wherein pupils feel they can speak freely, explore, and express unpopular views without fear of reprobation or discrimination (Lafaye, 2008). In that respect, classroom interactions constitute a small-scale democracy (Dassonneville et al.,

2012). Debates, the expression of viewpoints about politics, and the pooling of experiences in the classroom shape pupils' abilities to trust political institutions, as they perceive fairness in the discussion and in classroom interactions (Blankenship, 1990; Lafaye, 2008).

These interactions must occur in an open, supportive environment (Ehman, 1969; Hahn & Tocci, 1990). Classroom climate openness is a concept that refers to the way pupils are encouraged to develop and express their own views (Dassonneville et al., 2012; Torney-Purta, 2001). This notion can be captured by pupils' perceptions of having had a teacher who dealt with controversial societal issues quite often, and who maintained a neutral but objective position in an open atmosphere that encouraged students to express their opinions (Ehman, 1969). An open classroom climate is more conducive to pupils' inquiry and open-mindedness, which in turn leads to the development of democratic attitudes (Ehman, 1969). The classroom environment is considered a small-scale democracy pertaining to indirect forms of citizenship education, which aims to encourage pupils to hold democratically oriented interaction patterns within the school or classroom environment. Pupils experience democratic decision-making at the class or school level, which can be transferred and extended outside of the context at hand, in the political arena (Anderson, 2010; Claes & Hooghe, 2017).

Both direct and indirect forms of citizenship education yield pupils' sense of political efficacy and trust. As a result of their classroom instruction with content related to the political realm and issues, pupils are expected to gain better knowledge of the political systems and societal issues. In turn, they will develop a greater confidence in their understanding of the political domain and functioning of the political system. Classroom instruction results in higher levels of political efficacy and political trust (Claes & Hooghe, 2017; Maurissen, 2018). Indirect forms of citizenship education encouraging democratically oriented interaction also transfer to political efficacy and trust. Pupils acquire a sense of social trust through socializing experiences in the classroom (Hooghe et al., 2012). In turn, social trust has positive effects on political trust. Social interactions in an open classroom climate promote political trust, as it entails cooperation, collective and collaborative efforts. Feelings of political efficacy are also built on relationships in the classroom. Pupils who are successful in collaborating with others or in influencing the opinions of their peers tend to believe they might also be influential in a larger political environment. Meaningful experiences of democracy in an open classroom climate contribute to fueling pupils' sense of both internal and external political efficacy (Anderson, 2010).

Additionally, a number of recent studies demonstrated that new information and communication technology (ICT) is a central vehicle for citizenship education, as pupils have a high literacy and capacity, and a preference to engage with interactive web-based features (Bachen et al., 2008). Educational research has demonstrated that the medium of traditional, passive learning techniques such as rote memorization and recitation tend to be ineffective in fostering knowledge and democratic attitudes, unlike active teaching techniques (Bachen et al., 2008; Cohen et al., 2009; Dassonneville et al., 2012; Lahire et al., 1994; Torney-Purta, 2001). Moreover, an ICT platform has a greater benefit when it is perceived as a serious (Enyedi, 2016; Lupia & Philpot, 2005), attractive, or entertaining tool (Eveland & Scheufele, 2000). A positive user experience towards the tool and its features is also a crucial condition to the development of positive attitudes toward the object of the education platform (Hirzalla, 2010). Youth individuals, even those who otherwise avoid political information, make greater gains from attractive information (Eveland & Scheufele, 2000).

All in all, the present study starts with the assumption that school socialization and citizenship education activities yield political efficacy and trust. We also assume that new ICT tools can play a significant role in citizenship education by providing new opportunities for learning. Therefore, our study sets the focus on ICT platforms known as Voting Advice Applications to assess its influence on political efficacy and trust development among pre-voters. The following section provides extensive discussion on the framework of VAAs.

2.4. Voting Advice Applications

Practitioners acknowledge the potential of web-based and interactive platforms to be used as educational tools. Among the wide range of interactive learning tools, we find digital serious games, dynamic video, and VAAs. The latter links voters' preferences to parties' policy proposals; these tools then highlight the proximity between the user and the available political parties (Walgrave et al., 2009). In practice, users fill in an online survey according to their opinions on a set of issues (e.g., important political decisions must be left to the citizens through referenda, it must be easier to dismiss workers, etc.). Although different in some respects, Voting Advice Applications share a common operating principle: the applications compare voters' positions on policy issues with those of political parties, and they generate voting suggestions (Cedroni & Garzia, 2010; Garzia & Marschall, 2012, 2019).

In this section, we first address the issue of Voting Advice Application emergence and rise as part of the campaign information environment. Then, we will discuss the various types of VAA

effects identified in existing literature in Section 2.4.2. We identify three kinds of VAA effects: the statement effect, the advice effect, and the match effect. We examine the processes at play behind these effects. We also scrutinize social psychology research on cognitive processes and biases in dealing with political information. To conclude the present chapter, we highlight research gaps and provide takeaways that frame the rest of the thesis in Section 2.4.3.

2.4.1. From Election Campaign Information Tools to Research Objects

The very first Voting Advice Applications, although these tools were not yet referred to as such at the time, were developed in the Netherlands in 1989. De Graaf (2010) chronicles the birth and rise of the first computerized voting aid: The *StemWijzer*, which was intended for secondary education, was marketed in the form of a booklet with 60 statements and a floppy disk. The first version of the *StemWijzer* booklet achieved relative success within the educational sector, although only 50 copies of the floppy disks were sold. Political parties were placed on a one-dimensional left-right scale. When a user agreed with a statement, a certain number of points on a scale of 0 to 50 were given, depending on the party's position on that statement. The voting advice was calculated by dividing the total number of points with the number of approved statements. Since launching, *StemWijzer* has taken on an educational role, aiming to develop users' knowledge of the programmatic similarities and differences between political parties, and ultimately to assist them in making a voting choice. The first version was designed to show the political differences between the parties, based on the assumption that voters should be aware of these differences, and be able to compare them with their own opinions and political positioning. The first Internet-based *StemWijzer* was released a few years later for the 1998 Dutch parliamentary election.

VAA use then took a turn with the new information revolution and the democratization of the Internet since the 1990s, as the web was gradually introduced in Western homes for entertainment and other purposes. The web boom and the evolution of the Internet have led to the appearance of interactive, entertaining, and handy online tools. Beyond their educational role, VAAs were then claimed to be enlightening alternatives to traditional mainstream media in voters' opinion formation (Mayer, 2010). However, these platforms do not completely detach from the traditional media, since VAAs were and still are promoted by TV shows, radio, and newspapers (Garzia & Marschall, 2012; Talukder et al., 2021; Vitiello, 2018). It was against this backdrop that many more VAAs followed in the *StemWijzer*'s footsteps (among which were *Wahl-O-Mat* in Germany since 2002, *Smartvote* in Switzerland since 2003, and *Doe de Stemtest!* VAA and TV show in Flanders since 2003) (Garzia & Marschall, 2019).

Nowadays, Voting Advice Applications are well known to a broad audience as interactive information tools that offer an alternative to official platforms of political parties. Over the years, VAAs have become important players in the information environment of election campaigns in multi-partisan systems. VAAs are freely available online during election campaigns, and are widely used by voters for information or entertainment purposes. The Belgian VAA for the 2019 elections counts about 3.5 million completes for its Dutch version (*Stemtest*) and slightly less than 1 million completes for the Francophone version (*Test électoral*). As some voters visit these websites seeking guidance on choosing a party to vote for, others rather view VAAs as playful gadgets. As we shall see below, the type of users these tools attract changes over the course of a campaign (Hooghe & Teepe, 2007), and more generally over the years (Albertsen, 2020).

VAAs usually appeal, to a large degree, to citizens with an already high engagement in politics. The typical VAA user has a profile similar to that of the Internet user: young, man, higher educated, and with an above-average income (Cedroni & Garzia, 2010; Fivaz & Nadig, 2010; Garzia & Marschall, 2012). VAAs are sometimes blamed for "preaching to the converted", and thus missing their target (Boogers & Voerman, 2003; Fivaz & Nadig, 2010; Uyttendaele et al., 2020). However, evidence from a recent study in Germany indicates that the ever-increasing diffusion and popularity of VAAs contribute to reaching more and more women and groups with medium levels of education (Albertsen, 2020 – *Wahl-O-Mat* in the 2017 German election). It has to be noted that the *Stemtest/Test électoral* attracted rather young and politically interested users during the 2019 election campaign in Belgium, but there is no evidence that men were more likely to use the VAA than women (Talukder et al., 2021; Uyttendaele et al., 2020). In addition, there is some indication that VAA use has spread among older citizens, as the "65 to 74" age category is slightly but significantly overrepresented among *Stemtest/Test électoral* users compared to the general population of Belgian voters (Talukder et al., 2021).

Yet, VAAs designers' concern is to engage citizens that are disinterested in politics, to counter declining participation (Albertsen, 2020; Fivaz & Nadig, 2010). VAAs are information campaign mediums meant to primarily reach the less advantaged strata of society, such as less educated or low-income people – who also happen to be less informed and less involved in politics (Delli Carpini & Keeter, 1996; Verba et al., 1995). The claim is to provide citizens, especially those who are less interested in or informed about politics: "valuable information about candidates and parties running for elections, support citizens in the decision-making process in the course of elections, and allow for electoral choices which are closer to the political position of the voters"

(Garzia & Marschall, 2014). In that sense, such interactive tools are intended to contribute to taking up the challenge of tackling political inequalities.

In that respect, VAAs are expected to be particularly popular among young voters, and have the potential to increase voter turnout and political knowledge, and to foster democratic attitudes (see Section 2.4.3 below). While several scholars agree that VAAs can be potentially used as a tool for citizenship education (Fivaz & Nadig, 2010; Ilmarinen et al., 2022; Kristensen & Solhaug, 2017), very few studies have examined the effects of VAAs on young people in particular. VAA users are expected to feel better informed on political issues and parties, and to be better politically prepared than non-users (Boogers & Voerman, 2003; Enyedi, 2016). VAA usage appears to have an effect on electoral turnout, particularly among people at lower educational levels, younger people, and citizens with low levels of political information or interest, with a weak or no party identification and limited political knowledge. Since these are voters that appear to be more difficult to mobilize in elections, the widespread use of VAAs seems to contribute to the functioning of representative democracy, for which the level of electoral turnout is considered an important indicator (Gemenis & Rosema, 2014; Rosema et al., 2014).

In fact, VAAs are not set up to provide voting advice. A VAA outcome only displays a classification of all parties in terms of the degree of convergence between the parties' positions and the user's beliefs. The voters should not take the recommendation rendered by the VAA for granted. The objective is that the user receives an indication of their own location in the overall political landscape. The user, therefore, receives a nuanced picture of their own position, and of the position of each of the parties. This is why some argue that a VAA outcome should not be called voting advice but a voter profile. The predominant nomenclature of the instrument is misleading; some practitioners prefer to refer to Voter Engagement Applications (VEAs) instead (van der Linden & Dufresne, 2017).

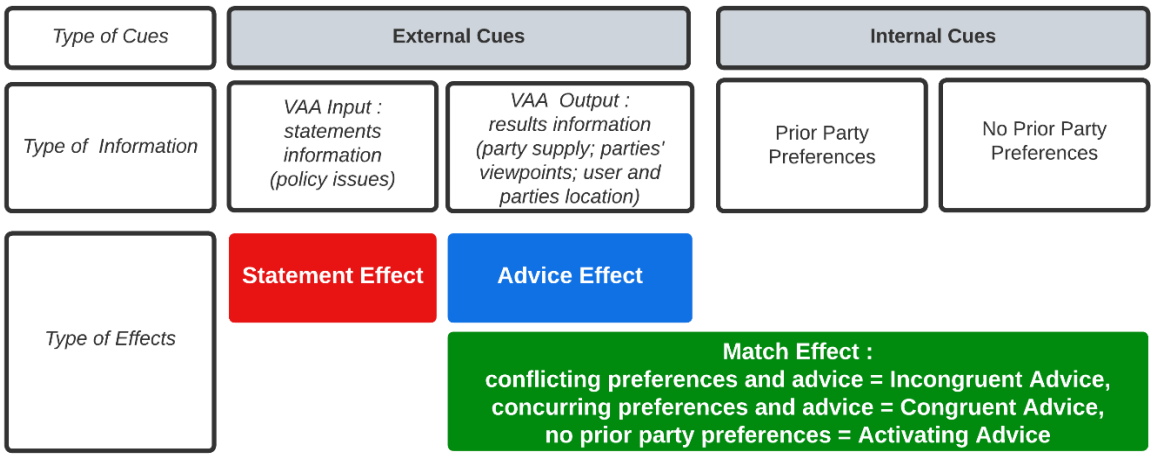
VAAs indeed benefit from a wide proliferation and high usage rates among voters. Research in various disciplines within social or data science turned their attention to VAAs as research objects. VAA research mostly focuses either on methodological issues of VAA design and their functioning (e.g., testing the validity of the voting advice) or on the effects of VAAs on voters (e.g., to what extent VAAs influence voting behavior, the propensity of users to vote for a certain party, knowledge of political issues, political participation, etc.) (Garzia & Marschall, 2012; Munzert & Ramirez Ruiz, 2020). Yet, VAA designers target young and less educated populations as the

primary beneficiaries of the tool. Research on the educational impact of VAAs among young people is thus lacking to firmly assess the success in achieving designers' goals.

2.4.2. VAA Effects

The present thesis leads the way to opening the black box of VAA effects. We identify three kinds of VAA effects as we review current VAA research (Kleinnijenhuis et al., 2017): the statement effect – the effect resulting from simple exposure to VAA statements; the advice effect – the effect resulting from receiving voting advice related to VAA use; and the match effect – the effect resulting from matching the advice with the user's prior party preferences. Figure 4 below depicts VAA information and types of effects. A VAA is viewed as an external cue of political information in one's informational environment. As a first step, users browse VAA statements and reflect upon policy issues. They can be considered as a first type of information contained in a VAA. The effects resulting from browsing VAA statements are labeled "statement effects". As a second step, users process their personalized voting advice that provides information on party supply and programs, and structures this information with the users' opinion on issues. The second step of information processing involved in visiting a VAA consists of exposure to a VAA's advice. The effects resulting from VAA advice exposure are labeled "advice effects". And as a last step, as illustrated in Figure 4 below, users apply this VAA output information by considering their prior knowledge and party preferences. The latter are considered as one's internal cues of political information. The effects resulting from matching the VAA output with the user's prior party preferences are labeled "match effects".

Figure 4. Typology of VAA Information and Effects



Note: Author's own elaboration.

Once users are gradually made aware of the policy issues, they are asked to give their opinion on each issue. The quiz mechanics lead them to reflect on public issues, and in turn, to express their preferences (Mahéo, 2016). It has to be noted that using a VAA might be the very first experience with some or any policy issues for young individuals. The mere exposure to policy issues and the fact of reflecting on these questions must not be underestimated in young citizens' development. VAAs may get citizens that are uninterested or have no or little first-hand experience with politics to think about policy issues (Dinas et al., 2014). For some, using a VAA might serve as a first opportunity to reflect on the substance of these issues. Therefore, VAAs may lead to opinion formation toward specific policy issues (Mahéo, 2016). Reflecting on such issues might be a cognitively demanding task for some users, especially for those who have never faced such questions. VAA users, just as opinion survey respondents, are asked to evaluate numerous policy statements, one after another, and to provide considered opinions on each. To do so, they must carefully interpret the meaning of each statement, search their memories extensively for all relevant information, integrate that information carefully into summary judgment, and report these cues in a relatable way or pick the response alternative that best conveys their opinion (Krosnick, 1991). Thus and so, they spend substantial cognitive effort to process this information and complete the task (Petty & Cacioppo, 1986).

The second kind of VAA effect, the advice effect, results from receiving voting advice that structures the user's issue opinions in party programs. VAAs provide information about policy issues, but they also analyze this information and assist the user in processing the information in light of a purportedly easy-to-understand results page (Garzia, 2010). As depicted in Figure 4, the instrument's output displays information on the range of party supply, their standpoints, their location within the political landscape (except VAAs using rankings visualization), and the user's ideological proximity to the available political parties. As users discover their personalized results page, they get familiar with the existing party supply, including political parties that they might not have initially known about (Mahéo, 2016). Users might also get a better knowledge of parties' views. Through its outcome, a VAA synthesizes political information and maps the political space.

The third and most complex VAA effect, the match effect, stems from matching the advice with the user's prior party preferences. As the users process the VAA output (external cue), they put their personalized voting advice in perspective and apply it to their pre-existing political knowledge and party preferences (internal cue), as depicted in Figure 4. Theories in (social) psychology, including cognitive dissonance, show strong evidence of different ways in which individuals cope with conflicting messages (Cacioppo et al., 1996; Festinger, 1957; Petty &

Cacioppo, 1986). Opinion change research deriving from these theories establishes that people are motivated to hold correct attitudes (Festinger, 1957; Petty & Cacioppo, 1986). An individual experiences cognitive dissonance as this person has two cognitions that psychologically do not fit together, e.g., one of these is the belief that their most preferred political party is Party A, and the other is the knowledge that they ideologically better match Party B, which was revealed through a VAA (see Figure 4 above). Discomfort is triggered by the individual's belief mismatch with the new information. An individual thus adopts coping strategies to resolve the contradiction and minimize discomfort. Among the possible strategies is changing their party preference, revisiting a VAA until one receives congruent advice, denying the validity of the source, and/or cherry-picking information sources.

Zaller (1992) argues that individuals' response strategies to political information depend on their acceptance of the message. Confirming information is viewed as agreeable information, which can therefore influence information-gathering processes (Taber & Lodge, 2006). It is difficult to make people change their attitudes, and individuals with fixed preferences are thus likely to mostly accept congruent information and discard incongruent and counter-attitudinal information. In turn, this mechanism tends to reinforce their attitudes or preferences (Cacioppo et al., 1996; Taber & Lodge, 2006). Being exposed to incongruent VAA advice might trigger discontent, especially among the most politically sophisticated users. As they are the most knowledgeable ones, they are better equipped to comprehend political information, and to resist persuasive appeals (Luskin, 1990; Petty & Cacioppo, 1986; Zaller, 1992).

Furthermore, evidence from psychology suggests that attitude-confirming information tends to reinforce one's attitudes and boost confidence (Cacioppo et al., 1996; Festinger, 1957; Wicklund & Brehm, 1976). It is found that attitude-consistent political messages drive attitude strength and self-validation (Taber & Lodge, 2006). Confirmation bias leads to one's thought confidence (i.e., confidence people have in their own thoughts) by clarifying one's own views. Attitude-consistent or attitude-discrepant political messages have thus the potential to (dis)empower the recipient. Information in line with the recipient's prior beliefs reinforces these beliefs and one's attitudes. The "political profile" provided by the VAA serves as a validating cue, as political information confirming one's political views.

Less is known about how individuals with few political resources and experiences – i.e., those unaware of politics or without prior party opinions – respond to political messages. Whether out of lack of interest, ability, or experience, some individuals have not (yet) developed an elaborate

knowledge structure about politics and partisanship (Taber & Lodge, 2006, see also Section 2.2.3 above for a review of the psychological engagement model). Political profile information cannot be specified as confirming or disconfirming information when an individual does not have any prior party opinion; rather, it constitutes an activation of new cognitions about party preferences. Individuals with prior party preferences use their beliefs as an internal cue to form an opinion (see Figure 4 above). VAA advice constitutes an external cue about party proximity. People with access to relevant internal cues use it to critically evaluate the message (Kruglanski et al., 1993; Wood, 1982; Wood et al., 1985, 1995). In the absence of an informational base, individuals cannot retrieve any attitude-relevant information, and must infer new cognitions from external cues (Wood, 1982). Those who are clueless about party politics do not possess any internal cues about their party identification. Since they lack a personal framework to process information about their political profile, individuals cannot rely on cognitive shortcuts, and instead must rely on external cues to form an opinion (Lau & Redlawsk, 2001; Lodge & Hamill, 1986). Individuals with no prior knowledge are found to be less resistant to informational influence, as they cannot effectively counter-argue the message (Wood, 1982). Hence, they are found to form an opinion consistent with the message position (Kruglanski et al., 1993; Wood et al., 1985). In sum, disconfirming advice likely leads to attitude change, confirming advice likely leads to attitude reinforcement, and activating advice likely leads to forming a first party identification attitude.

Regarding the three types of VAA effects we just discussed, Table 1 below displays an overview of VAA effect studies in the existing literature. However, most studies overlooked the driving processes under which the effect of VAAs might be observed. VAA research on the instrument's effects mainly investigated five different outcomes: turnout, party choice, political knowledge, information-seeking behavior about election campaigns, and internal political efficacy.

We identified only one study for VAA effects on IPE, i.e., one of the dependent variables of interest in this thesis – see van de Pol (2016). We discuss this research gap further in the next section (Section 2.4.3, 'VAA Research Gaps'). To my knowledge, no study has yet addressed EPE or political trust as dependent variables.

Table 1. Overview of VAA Effect Studies

	Turnout	Vote choice	Political Knowledge	Information-seeking behav.	Internal Pol. Efficacy
Statement effect studies					
	No studies	*No studies*	*No studies*	*No studies*	*No studies*
Advice effect studies					
Negative effect	Dinas et al., 2014	/	van de Pol, 2016	/	/
Positive effect	Fivaz & Nadig, 2010 Garzia et al., 2014 Garzia et al., 2017 Gemenis & Rosema, 2014 Germann & Gemenis, 2019 Heinsohn et al., 2016 Heinsohn et al., 2019 Marschall & Schultze, 2012 Vassil, 2011	Andreadis & Wall, 2014 Benesch et al., 2023 Fivaz & Nadig, 2010 Garry et al., 2018 Germann et al., 2022 Germann et al., 2023 Kamoen et al., 2015 Kamoen et al., 2022 Klein Kranenburg, 2015 Pianzola, 2014a Pianzola, 2014b Stadelmann et al., 2022 Wall et al., 2014	Heinsohn et al., 2016 Kamoen & Liebrecht, 2022 Kamoen et al., 2015 Kamoen et al., 2022 Munzert et al., 2020 Schultze, 2014 Uyttendaele et al., 2020	Fivaz & Nadig, 2010 Heinsohn et al., 2016 Heinsohn et al., 2019 Mahéo, 2017	van de Pol, 2016
Null effect	Benesch et al., 2023 Enyedi, 2016 Gemenis, 2018 Mahéo, 2017 Munzert et al., 2020	Enyedi, 2016 Mahéo, 2016 Munzert et al., 2020 Pianzola et al., 2019 Vassil, 2011 Walgrave et al., 2008	Heinsohn et al., 2019 Westle et al., 2015	/	/
Match effect studies					
			No studies	*No studies*	*No studies*
Positive effect	/	Alvarez et al., 2014 Enyedi, 2016 Gallina, 2018 Klein Kranenburg, 2015 Kleinnijenhuis et al., 2017 Stadelmann et al., 2022 Talukder et al., 2021 Wall et al., 2014	/	/	/
Null effect	Enyedi, 2016	Mahéo, 2016	/	/	/

Note: Author's own elaboration.

We find no VAA statement effect studies in the existing literature. We discuss the lack of research on VAA statement effects in Section 2.4.3, 'VAA Research Gaps' below. However, we might expect to find a statement effect on young users' awareness of political issues, cognition, and political knowledge. In turn, political knowledge is likely to enhance their understanding of societal problems, and ultimately their democratic and political attitudes, such as political efficacy and trust. Contrary to the statement effect, VAA research tackles the VAA advice effect on voters' turnout, vote choice, political knowledge, information-seeking behaviors, and political attitudes. It has to be noted that existing studies do not call these effects "advice effects" per se, since it does not apprehend the statement and advice effects separately (see Section 2.4.3, 'VAA Research Gaps'). They rather refer to general VAA effects when examining actual advice effects.

In the existing research tackling the so-called advice effect, VAAs are found to mobilize citizens to vote (Fivaz & Nadig, 2010; Garzia et al., 2014, 2017; Gemenis & Rosema, 2014; Germann & Gemenis, 2019; Heinsohn et al., 2016, 2019; Marschall & Schultze, 2012; Vassil, 2011). A study by Germann & Gemenis (2019) addresses the issue of VAA (advice) effects on turnout using matching techniques to tackle self-selection into VAA participation in observational studies. Results show that VAA users are more likely than non-users to vote. This finding is supported across several Swiss federal elections (2007, 2011, and 2015). However, other studies using rigorous experimental design or sophisticated matching techniques do not find any effect of VAAs on turnout (Benesch et al., 2023; Enyedi, 2016; Gemenis, 2018; Mahéo, 2017; Munzert et al., 2020). Only Dinas et al. (2014) find VAAs to have demobilizing effects.

VAAs are also found to influence vote choice (Andreadis & Wall, 2014; Benesch et al., 2023; Fivaz & Nadig, 2010; Garry et al., 2018; Germann et al., 2022, 2023; Kamoen et al., 2015, 2022; Klein Kranenburg, 2015; Pianzola, 2014a, 2014b; Stadelmann-Steffen et al., 2022; Wall et al., 2014). Andreadis & Wall's (2014) study investigates VAA (advice) effects on vote switching using data from several national election studies (Finland 2003–2011; Germany in 2009; Netherlands 2003–2011; and Switzerland 2007–2011). Their study reveals that VAA use is associated with an increased likelihood to switch parties, either between elections or in-campaign. Few panel studies find no influence on vote choice (Israel et al., 2017; Walgrave et al., 2008), just as most experimental studies do not find that VAAs have any effects on vote choice (Enyedi, 2016; Mahéo, 2016; Munzert et al., 2020; Pianzola et al., 2019; Vassil, 2011).

Evidence shows that VAAs enhance political knowledge (Heinsohn et al., 2016; Kamoen & Liebrecht, 2022; Kamoen et al., 2015, 2022; Munzert et al., 2020; Schultze, 2014; Uyttendaele et

al., 2020). Kamoen et al. (2015) investigate VAA (advice) effects on users' political knowledge, controlling for demographic variables, personality characteristics (including internal and external efficacy), and individual reasons for using a VAA. They find that VAA users feel they have improved their political knowledge. Perceived knowledge is found to be even more affected among younger users, and those who are more highly educated. In this way, as this study considers subjective knowledge, it indirectly addresses VAA effects on the knowledge component of IPE, which provides an initial understanding of the potential influence of these tools on young users' IPE. They also find a larger knowledge increase among individuals who are uncertain of whom to vote for, who consider the VAA as a serious advice instrument, and those who have a strong need for cognition (i.e., who tend to engage in and enjoy thinking). It should be noted that they do not find any differentiated effect of political efficacy on political knowledge. Other studies nuance these findings as they find no evidence of such effects (Heinsohn et al., 2019; Westle et al., 2015) or a negative effect of VAA use on political knowledge, comprised as one's knowledge of parties' positions on ideological issues (van de Pol, 2016). It must be noted that the studies by Kamoen & Liebrecht (2022) and Kamoen et al. (2022) examine specific kinds of VAAs, i.e., Conversational Agents VAAs (CAVAAs) that integrate chatbots with additional semantic and pragmatic information on policy statements. Dutch voters who visit CAVAAs are found to report higher political knowledge and better user experience than those who used "traditional VAAs" (Kamoen & Liebrecht, 2022).

And last on the question of VAA advice effects, VAAs are found to stimulate information-seeking behaviors or attentiveness during election campaigns (Fivaz & Nadig, 2010; Heinsohn et al., 2016, 2019; Mahéo, 2017). Mahéo's (2017) study demonstrates that Voting Advice Applications fulfill their purpose of getting new people to psychologically engage in electoral politics. Evidence shows that lower-educated users benefit the most from the VAA, as it stimulates their attentiveness to electoral campaigns. These findings have major implications for VAA designers, as they are primarily made to inform and educate citizens during electoral campaigns. VAAs facilitate reducing political equalities, as individuals with lower levels of political resources make greater gains in terms of campaign attentiveness.

As illustrated in Table 1, VAA research mostly addresses VAA match effects on the party preference of adult citizens who already have the active right to vote. Only Enyedi's (2016) study investigates the VAA match effect on turnout. Looking at Table 1, it is striking that studies on VAA match effects only tackle voting behavior as an outcome. These studies do not consider VAA match effects on political knowledge, information-seeking behavior, or political attitudes. Most of

these studies are observational panel studies; only Enyedi (2016), Mahéo (2016), and Stadelmann-Steffen et al. (2022) have used experimental techniques to investigate VAA match effects.

Research on the VAA match effect stems primarily from issue voting models and findings on electoral volatility (Stadelmann-Steffen et al., 2022; Talukder et al., 2021). This literature primarily regards the match effect in terms of the overlap between voting advice and users' prior party preferences. A VAA indeed provides tailor-made information to the user. A VAA not only offers information on political parties' issue positions but reveals the structure of party competition in light of the user's issue preferences. As an outcome, the user receives a political mirror, or in other words, a customized view of the political supply. In that sense, the VAA output may convey the information that the user's perceptions of party positions differ substantially from the actual party positions (Walgrave et al., 2009). VAAs thus help voters to recognize the party that is most proximate to their policy preferences. During election campaigns, these informational tools bridge the information gap leading voters to opt for parties that do not necessarily reflect their values and interests (Pianzola et al., 2019; Walgrave et al., 2009). VAAs could help users to vote for the party that is most "issue-congruent" with them (Talukder et al., 2021). Nevertheless, findings show that the user does not necessarily cast their vote in line with the VAA advice. VAA makers indeed aim to provide the user with comparative and accessible information, and to lead them to reflect on their political preference, rather than to persuade them to change their preference (Mahéo, 2016).

The overlap between the user's party preferences and the VAA advice can be conceptualized as "VAA advice congruence". Other terms for (issue-)congruent advice used in the literature include (preference-)confirming advice (Enyedi, 2016; Klein Kranenburg, 2015; Mahéo, 2016; Talukder et al., 2021; Wall et al., 2014), positive advice (Kleinnijenhuis et al., 2017), or consistent advice (Alvarez et al., 2014; Gallina, 2018). Conversely, incongruent advice is also called contradictory, disconfirming, negative, or inconsistent advice. Scholars have measured VAA advice congruence in various ways (see Chapter Three, Section 3.3.4 below) and existing observational and experimental studies lead to conflicting findings on match effect, as reviewed in Table 1.

Alvarez et al. (2014) investigated the effects of advice congruence on users' party preference. Two approaches are used to bond users' party preference and VAA advice: the issue-voting approach – assuming that voters choose a party based on candidates' position on policy issues; and the agenda-setting/learning approach – acknowledging the campaign effects on voters and media influence on agenda-setting and issue framing. VAAs are thus viewed as important players during election campaigns by positioning the user in the political landscape in light of their

own preferences. The authors consider the VAA result as "a form of political matchmaking" or a "personal political mirror" (Alvarez et al., 2014, p. 229). Results from their study using a dataset stemming from users of the 2009 pan-European VAA "EU Profiler" show that less than one out of five users match best with their most preferred party. Most users do not change their party preference in line with their best-matching advice, even those who were exposed to incongruent advice. The results suggest that users who show higher levels of political interest are less likely to switch preferences after receiving incongruent advice. Wall et al. (2014) also find a positive effect of congruent advice on users' vote choice. They did not find such an effect among voters who reported that they were only considering one party for their vote choice. These findings indicate that the match effect of VAAs is largely confirmatory rather than persuasive.

Similarly, Klein Kranenburg's (2015) study shows evidence that decided voters, as well as those with high political knowledge or strong party identification, tend to remain loyal to their vote preference if they receive confirming advice, compared to those who receive disconfirming advice. However, participants in this study were asked to self-report the voting advice rendered by the instrument. From past survey studies, experiences, and political psychology research on cognitive dissonance (as further developed below), we know that participants in election studies are biased in reporting their voting advice in favor of the party they stand for, to reduce inconsistencies (dissonance) in their own beliefs (Festinger, 1957; Petty & Cacioppo, 1986). In fact, the share of users who reported receiving congruent advice seems to be overrepresented in this study. Klein Kranenburg (2015) is the only VAA match effect study that indicates that most users – i.e., 55% – receive congruent advice, in contrast to other studies, which all show that these users are in the minority.

Talukder et al. (2021) used the two-wave panel survey "2019 Represent Belgian Election Study", and had similar findings. Their results show that less than two out of five users received confirming advice. Furthermore, receiving disconfirming advice from the VAA increases the probability of users switching their vote choice during the 2019 electoral campaign for the Belgian federal elections. Similar to Alvarez et al. (2014), the findings show that users do not necessarily switch in line with the voting advice provided by the VAA. Kleinnijenhuis et al.'s (2017) study is complementary to these studies, and shows a positive match effect on vote switching, especially among doubting voters.

Three experimental studies also tackled the effects of the VAA results type on voting behaviors. Stadelmann-Steffen et al. (2022) investigate how a VAA influenced vote intentions

during the 2017 referendum on the new energy law in Switzerland. Mahéo (2016) examines whether receiving advice that confirms or disconfirms initial preferences affects electoral preferences by relying on a longitudinal experimental study carried out during the 2014 Quebec provincial election campaign. The findings show that two out of five participants received confirming advice. However, she finds little durable VAA effect on electoral preference, and does not find that receiving incongruent advice from the VAA leads to preference switching. Enyedi (2016) also finds little effect of the VAA results type on party switching. The findings show that 44.6% of VAA users received advice that confirms their party preferences. Users who were exposed to congruent advice were more likely to stay loyal to their most preferred party. Very few users turned away from their favorite party in order to follow VAA recommendations that contradicted their original preferences. Moreover, they do not find any significant match effect on turnout, and argue that the type of advice one is exposed to does not influence their decision to go to the polls.

2.4.3. VAA Research Gaps

The review of the existing VAA literature allows us to bring research gaps to light, whether they consist of methodological flaws in the research and tool's design, or gaps of knowledge on the topic. As regards the methodological limitations in VAA research, we discuss the lack of controlled experimental studies that would disentangle statement from advice effects, and we also address the lack of research examining VAA effects over time, the self-selection bias, and the designer-researcher bias. The shortcomings we identified in the VAA effects literature relate to the lack of research on the effects of VAAs on political attitudes, to the pre-voter population, or to investigating VAA usage outside of election campaigns. In the present subsection, we further discuss these research gaps and our contribution to filling these gaps.

As regards the methodological flaws in VAA research, there is a lack of adequate scientific research that distinguishes statement effects from advice effects. Randomized experiments are increasingly used to investigate VAA effects in recent years (see Table 1 for an overview). It is interesting to note that many experimental studies, in stark contrast to observational studies, tend to find no significant effects of VAA usage on turnout and vote choice. There is a general dearth of knowledge and research scrutinizing the full range of the possible VAA effects. To my knowledge, no study considers distinguishing the effects resulting from the exposure to VAA statements only (statement effect) from the effects resulting from the exposure to VAA advice as an outcome of VAA usage (advice effect). As a consequence, all existing studies fail to show that the effect they observe is the result of the advice generated by the instruments (VAA output

information), and it remains unexplained whether mere exposure to and reflection upon VAA statements (VAA input information) have an impact on users' political knowledge, behaviors, or attitudes. Assessments disentangling the statement from advice effect are achievable only in cases when we scrutinize users who would only benefit from the VAA input information, differentiated from those who would benefit from the instruments' output as well, as illustrated in Figure 4 above. Hence, there is an urge to improve research designs and experimental protocols that differentiate these two groups of users. The present study is the first to empirically investigate this conceptual distinction.

In addition, while Andersen (2020) has examined how the characteristics of VAA users have developed over time, there is no research that examines the effects of VAAs over months or years. Effect studies mostly refer to short-term effects, and largely omit assessments of how durable they are. Without any study conducted over an extended period of time, we cannot state how VAAs affect users in the medium or long run. The present study tackles this research gap by investigating VAA effects on pre-voters in the medium run, namely one month after VAA usage.

On another note, VAA research suffers from a recurring sample self-selection bias. VAAs are freely available online during election campaigns and usually attract, to a large degree, citizens with an already high interest in politics. The typical VAA user has a profile similar to the average Internet user: young, man, higher educated, and with an above-average income (Fivaz & Nadig, 2010). In addition, existing research might have failed to capture inequalities, as some individuals are unable to access or use VAAs due to a lack of political, digital, or information literacy. If the aim is to claim the causal effect of using VAAs, a comparison of VAA users (experimental treatment group) to non-users (control group) should be made (Mahéo, 2016; Stadelmann-Steffen et al., 2022). Related to this issue of self-selection and lack of experimental studies, existing VAA literature might have overestimated the actual effects of VAAs. In that sense, our study aims to provide solid evidence of actual VAA effects thanks to a reliable experimental protocol that involves two intervention groups and a control condition.

Another limitation in VAA research that Table 1 allows us to highlight is the designer-researcher bias, namely that the researcher takes both the roles of designing the intervention and investigating its effect empirically in the field. A large number of VAA researchers also contributed to the development of the application. We acknowledge the researchers' positionality resulting from their stance in relation to the research topic. The positionality hence shapes the research process from the formulation of the research question to the interpretation of the findings. We

further discuss this issue in Section 3.6. (Validity & Limitations of the Study) in the following chapter.

As regards the gaps in knowledge, our literature review reveals a lack of research assessment regarding VAA effects on users' political attitudes. Scholars keep on claiming the potential of the tool to foster democratic attitudes among users, especially young, less engaged, and less educated voters (Fivaz & Nadig, 2010; Ilmarinen et al., 2022). However, VAA research barely considers uncovering the VAA outcomes on political attitudes. To my knowledge, there is no published research bringing to light VAA effects on EPE or political trust. We identified only one published study appraising VAA effects on IPE, this being van de Pol's (2016) doctoral thesis, which tackles IPE as a dependent variable of VAA usage. Thereupon, the key question of VAAs' implications for the future of democracy is hardly addressed in the existing research. Our research bridges this gap by investigating a VAA's influence on young users' sense of IPE, EPE, and political trust.

Moreover, while VAA designers are aware that their instruments are used in the classroom, they do not address their effects on pupils in their research. VAA designers, who mostly come from the political science community, create tools for pedagogical purposes. They seem to be reluctant to venture into the empirical evaluation of VAA effects on pupils, in the way that educational scientists evaluate the effects of interventions and school programs in their research. We thus deplore the lack of empirical assessment of VAA effects on pre-voters and pupils, i.e., the audience that can benefit the most from the educational potential of these tools. In this respect, the present study addresses the research vacuum in examining VAA effects on school-aged users.

Although it is anticipated that using these interactive tools in the classroom provides alternative guidance to parents and other socialization agents, and hence allows one to overcome inequalities in political resources, there is no empirical evidence on whether their design is well suited to the pre-voting age audience. In that regard, one can foresee limitations of VAAs in their design itself, the two main issues being their short duration of use, and whether they are suitable for young users. One may wonder whether such a brief intervention is sufficient stimulus to have effects on political attitudes (our data shows that the average length of VAA intervention is 7'27" – see Section 3.3.6 in Chapter Three). Moreover, since VAAs are foremost designed to provide voters with guidance during election campaigns, one may wonder whether VAAs are suitable tools for pre-voters, and whether they have sufficient political resources and literacy skills for using a VAA. We address this question in Chapter Three before running further empirical analyses on VAA effects in the following chapters.

Furthermore, the VAA research community is well aware that citizens get to use these instruments also outside election campaigns. These websites are mostly covered by media, and thus visited during these periods. Although these are purposely made to provide guidance during election campaigns by leading citizens to reflect on the issues at stake, they are also made to inform and educate outside of these periods. Besides, some designers deliberately choose to deliver VAAs with generic or ideological statements, in addition to those that display campaign-specific statements, in order to extend the life and usage potential of their instruments. The designers of the Canadian VAA, i.e., the *Vote compass* or *Boussole électorale*, opt for this distribution strategy and offer a different instrument respectively for its campaign and educational versions. However, we find no empirical evaluation of the use of these tools and teaching programs in the scientific literature. Empirical assessments are nonetheless essential to provide a meaningful way for designers to receive feedback on the quality of their work and for educators in both in-school and out-of-school settings to more fully tap this potential (Kahne et al., 2012). The present study brings prime evidence regarding VAA use outside of election campaigns, and hence contributes to the understanding of the longevity of such applications.

Our review, crossing the literatures on political attitudes, political socialization, and Voting Advice Applications, provides hints about VAAs being potential alternative agents of socialization for pre-voters. VAAs might be tools through which young individuals acquire autonomous experiences toward politics. Even though the instrument does not completely detach from traditional media, VAAs aim to provide objective information on politics. Used in the classroom, VAAs do not completely detach from school socialization processes either; they rather constitute teaching material. Nonetheless, they aim to deliver non-partisan, objective, and scientifically accurate information. In that way, the present literature review lays the foundation for the development of research questions and hypotheses in the following section. In addition, the theoretical considerations presented in the present chapter are helpful for conceptualizing the theoretical and analytical framework discussed in Chapter Three.

2.5. Research Questions and Hypotheses

The present study is at the crossroads of political attitudes, political socialization, and VAA research. In this chapter, we first reviewed the literature on the development of political efficacy and trust, as well as its implications. Our theoretical framework demonstrates that political efficacy and trust are crucial contributing factors to citizens' democratic participation (see for instance, Anderson, 2010; Craig, 1979; Craig et al., 1990; Sharoni, 2012; Tzankova et al., 2020; Verba et al., 1995). We argue that political efficacy and trust result from political socialization dynamics, and must be developed at the pre-voting age. Many valid reasons for this have been cited and empirically investigated, among which is the fact that pre-voters have little or no first-hand experience regarding politics but still have the cognitive ability to develop political attitudes (Anderson, 2010; Galston, 2001; Sapiro, 2004).

On top of that, we hypothesize that VAAs have the potential to build up pre-voters' political efficacy and trust. One might view Voting Advice Applications as a suitable information and communication technology for citizenship education. VAAs might be tailored political learning tools that make it possible to conveniently, efficiently, and engagingly inform young citizens. They can offer alternative guidance in opinion formation to family, school, or traditional mass media influences (Mayer, 2010). In this sense, our study tackles the lack of research on the effects of VAAs on young individuals. Nevertheless, we must disambiguate the different types of effects that a VAA could have on users' political efficacy and trust. Hence, we distinguish the statement, advice, and match effects as developed in Section 2.4.2 above. VAA effects may be attributed to one or a combination of several of these effects.

Therefore, we form three research questions. The first one constitutes the lead research question of the present research**: To what extent does a VAA have an impact on pre-voters' political efficacy and trust? (RQ1)** Furthermore, we wonder whether the VAA effects last in time and, whether the app succeeds in addressing the inequalities in political resources based on individuals' socio-economic backgrounds. Hence, we ask the two following sub-questions: **To what extent does a VAA have a lasting impact on pre-voter's political efficacy and trust? (RQ2) and To what extent is there a difference in VAA effect based on SES? (RQ3).** Table 2 below offers a summary of research questions and hypotheses. In the present section, we further develop our research questions and hypotheses about VAA effects on pre-voters.

Table 2. Research Hypotheses

Statement effect:		
IPE	EPE	Political Trust
H1 VAA statements exposure has a positive impact on pre-voters' IPE	H2 VAA statements exposure has a positive impact on pre-voters' EPE	H3 VAA statements exposure has a positive impact on pre-voters' political trust

Advice effect:		
IPE	EPE	Political Trust
H4 VAA advice exposure has a positive impact on pre-voters' IPE	H5 VAA advice exposure has a positive impact on pre-voters' EPE	H6 VAA advice exposure has a positive impact on pre-voters' political trust

Match effect:		
IPE	EPE	Political Trust
H7a incongruent advice exposure has a negative impact on pre-voters' IPE	H8a incongruent advice exposure has a negative impact on pre-voters' EPE	H9a incongruent advice exposure has a negative impact on pre-voters' political trust
H7b congruent advice exposure has a positive impact on pre-voters' IPE	H8b congruent advice exposure has a positive impact on pre-voters' EPE	H9b congruent advice exposure has a positive impact on pre-voters' political trust
H7c activating advice exposure has a positive impact on pre-voters' IPE	H8c activating advice exposure has a positive impact on pre-voters' EPE	H9c activating advice exposure has a positive impact on pre-voters' political trust

Note: Author's own elaboration.

Based on previous studies, we hypothesize that VAAs have three kinds of effects on each of the three DVs. In that sense, our research tackles a lack of understanding of the various types of effects. Disentangling the different types of VAA information and effects is at the core of this study. First, we describe the development of the hypotheses for the first research question on the main effects of VAA. In Section 2.5.1 below, we develop our hypotheses on the statement effect (Hypotheses 1 to 3). Then, we turn to our hypotheses on the advice effect in Section 2.5.2 (Hypotheses 4 to 6), and our sets of hypotheses on the match effect in Section 2.5.3 (Hypotheses 7 to 9). Moreover, we develop our second research question on the medium-term effects of VAA in Section 2.5.4. We conclude the present chapter by presenting the last research question addressing inequalities in political resources in Section 2.5.5.

2.5.1. Statement Effect

The first kind of VAA effect, the statement effect, results from simple exposure to the policy statements of such tools. Using a VAA consists in reading VAA statements, as a first step, and answering agree-disagree VAA items in sequence, as a second step. As the VAA displays a battery of questions on policy issues, our first claim is that they raise users' awareness of the policy issues at stake in the political arena. These tools offer readily digestible and aggregate information on a selection of political issues. VAA statements have the potential to raise awareness among young users about the policy issues at hand, and to catch their clear interest in those topics. Moreover, our second claim is that the mere use of VAAs may lead to opinion formation on specific policy issues (Mahéo, 2016). Although the VAA statement effect has been chronically overlooked in the existing literature, we have theoretical reason to think that such an effect might be found among pre-voting users of VAAs. We explain the reasoning behind the hypotheses' development on the statement effect for the three DVs in what follows. We empirically investigate the statement effect in Chapter Four.

First, we examine the statement effect on IPE. VAA statements display an array of policy issues that are at stake during an election. This kind of information might significantly inform the user on the wide range of issues being debated in the political sphere. For young users with no or little prior political information, the simple fact of acknowledging policy issues introduced by VAA statements might be significant information because it has the potential to raise awareness about the content of the issues discussed in the policy arena. In addition, users are asked to reflect and to form opinions on these issues. VAA statements might provide a framework for thinking about what politics involve (Beaumont, 2011; Levy, 2013). They might thus facilitate an understanding of political issues.

Therefore, we assume that VAA statements cognitively engage users to examine their perception of their ability to understand, discuss, and participate in politics. In that sense, one might expect that the mere exposure to VAA statements contributes to developing pre-voters' IPE. We posit that **"VAA statements exposure has a positive impact on pre-voters' internal political efficacy"** (Hypothesis 1).

Second, we scrutinize the statement effect on EPE. VAA statement information constitutes information on policy agenda. Agenda-setting is the first step in decision-making, and defines the priority issues of public authorities (Bevan & Jennings, 2014; Jones & Baumgartner, 2004). It is

found that information on policy issues signals that these questions are likely to be addressed by policy-makers (Bevan & Jennings, 2014). Issues attention allocation is an important dimension of policy-making, as it is a necessary condition for policy change (Bevan & Jennings, 2014; Jones & Baumgartner, 2004). Citizens can use such information on issues' attention allocation as a standard for judging the responsiveness of policy-makers (Esaiasson & Wlezien, 2017; Jones & Baumgartner, 2004). Agenda-setting indeed reflects the extent to which their actions follow what the citizens want. Hence, observing that politicians consider the importance of certain issues affects citizens' beliefs regarding authorities' responsiveness or lack thereof (Esaiasson & Wlezien, 2017). As young users are introduced to VAA statements, they collect information on policy issues that made it to the agenda. Such aggregation of several policy domains gives the perception that authorities tackle to some extent domains that matter to the citizens (Esaiasson & Wlezien, 2017). Hence, via VAA statements, pre-voters are provided with evidence that the issues that matter to them made it to the agenda in the political arena.

In that sense, we assume that, as young VAA users gain insight on the content of political discussion, they are likely to recognize that the issues concerning them are being addressed by the authorities. Thus, as they think about political issues, young users might develop a sense of EPE. We hypothesize that **"VAA statements exposure has a positive impact on pre-voters' external political efficacy"** (Hypothesis 2).

Lastly, we examine the statement effect on pre-voters' political trust. It must be noted that we cannot assess the main and immediate statement effect on political trust, as the latter variable was not measured in Wave 2 (see Section 3.3 in Chapter Three for further discussion on variables measurements). Yet, we can evaluate statement effects on political trust one month after VAA statements exposure, but one must bear in mind that VAA influence can be tainted/contaminated with the effects of time or classroom discussion (see Section 2.5.4. The Medium-Term Effects, below). Hence, as we claim a VAA effect on political trust, such tools must be viewed as informational material or media used for citizenship education in the classroom. It is found that educational material that succeeds in unraveling the tasks and responsibilities of political institutions result in a greater appreciation of the complexities of politics and decrease political cynicism (Denver & Hands, 1990). Trust in the political institutions in democratic systems builds upon a better understanding of how democracy works. It is argued that teaching pupils about political issues is positively related to political trust (Dassonneville et al., 2012; Ehman, 1969). VAA statements provide substantial information about the policy proposals involved in an election

(Garzia, 2010). In that sense, VAA statements might create opportunities to raise users' awareness of the political issues at stake, and ultimately catch clear interest that would build up political trust.

Hence, we foresee that VAAs' policy statements might establish an understanding of political issues that lays the foundation for political trust. On that basis, we expect that exposure to VAA statements contributes to developing pre-voters' political trust. We hypothesize that **"VAA statements exposure has a positive impact on pre-voters' political trust"** (Hypothesis 3).

2.5.2. Advice Effect

In Chapter Five, we turn to the investigation of our hypotheses on the VAA advice effect on our three DVs. The second kind of VAA effect, the advice effect, results from receiving voting advice that structures the user's issue opinion with party programs. Our review of VAA effect studies in Section 2.4.2 above has demonstrated that the VAA advice effect is the most widely investigated in the literature (see also Table 1 above). VAAs provide information about policy issues, but they also analyze this information and assist the user in processing this information, in light of an easy-to-understand results page (Garzia, 2010). The instrument's output displays information on the range of party supply, their standpoints, their location within the political landscape (except VAAs using rankings visualization), and the user's ideological proximity to the available political parties. As users discover their personalized results page, they get familiar with the existing party supply, including political parties that they might not have initially known about (Mahéo, 2016). Users might also get a better knowledge of parties' views. Through its outcome, a VAA synthesizes political information and maps the political space (see also Figure 4 above). Studies have found that young audiences tend to make greater gains as political information is understandably and attractively conveyed (Dicheva et al., 2015; Eveland & Scheufele, 2000). Hence, we expect that being introduced to what political parties offer and having a "political mirror" held up to them positively influences our three DVs. We develop our hypotheses on the advice effect in what follows.

First, we scrutinize the advice effect on IPE. Evidence shows that VAA output information conditions the mobilization or demobilization of voters and stimulates users' psychological engagement with electoral campaigns (Mahéo, 2017). VAAs are also found to create a sense of subjective political knowledge, especially among young users (Kamoen et al., 2015). In addition, van de Pol's (2016) study provides the first significant indication that using a VAA leads to higher IPE, especially among lower educated users. In that way, VAAs may be useful material for young

users to recognize their proximity to political parties, and to empower their feelings of IPE. In that sense, VAA advice provides cues needed to understand the workings of the political landscape and one's position within it. Information on political actors, including VAAs, might provide young people with the tools needed to boost their sense of ability to understand and participate in politics (Pasek et al., 2008).

In light of this, we state that the VAA output might offer accessible information that sparks a sense of ability to understand politics. We expect that receiving voting advice makes a difference to yield users' IPE. Hence, we hypothesize that **"VAA advice exposure has a positive impact on pre-voters' internal political efficacy"** (Hypothesis 4).

Second, we turn to the effect of advice on EPE. The latter touches upon one's image of the capacity and the success with which the democratic political system responds to public preference (Balch, 1974; Borgonovi & Pokropek, 2017; Davis, 2014; Lane, 1959). EPE concerns citizens' perception of the responsiveness of political bodies and actors to their demands (Balch, 1974; Borgonovi & Pokropek, 2017). In that sense, to assess the quality of political representation, citizens might refer to their degree of ideological proximity with political parties. Since the VAA calculates users' ideological congruence on their behalf, they might take a cue from the VAA's output for evaluating the quality of representation of the party system and the responsiveness of political parties. Using a VAA can result in the perception that one's political views are to some extent echoed by at least one of the available political parties (Dinas et al., 2014).

In other words, using a VAA may give a user the perception that there is a political party that represents their views, and in turn may boost one's sense of EPE. One's enhanced sense of EPE can result from one's feeling of satisfaction with the political system, as they find a closer alignment between their own beliefs and the stances of political parties. Hence, we expect that **"VAA advice exposure has a positive impact on pre-voters' external political efficacy"** (Hypothesis 5).

Lastly, we examine the advice effect on pre-voters' political trust. Mayne & Hakhverdian (2017) demonstrate that one's sense of proximity between citizens and their representatives boosts their satisfaction with institutions. Citizens readily grant legitimacy to political parties, politicians, or elected representatives as they perceive that they satisfy people's interests. With a better understanding of the political landscape, citizens are willing to trust political institutions to take political action on their behalf (Craig et al., 1990). Yet, an improved understanding is also found to sometimes lead citizens to view political institutions with a critical eye, and in turn to distrust

(Hooghe & Zmerli, 2011, see Section 2.2.2 above). Hence, one could foresee a detrimental effect of VAA advice on political trust. On the other hand, as VAA output allows users to discover and evaluate their proximity to political parties, they are consequently able to assess the quality of representation of the political actors, and to appraise their satisfaction with political institutions. That being said, our study takes into account the positive VAA effect hypothesis on pre-voters' political trust, as a substantial body of literature demonstrates a positive influence of political information on young individuals' political trust (see for instance, Dassonneville et al., 2012; Ehman, 1969; Galston, 2001).

From that perspective, as users might get a sense that the parties offered within the political system meet citizens' demands to some extent, we expect that VAA advice exposure leads to a positive appraisal, and to trust of political institutions. Thus, we hypothesize that **"VAA advice exposure has a positive impact on pre-voters' political trust"** (Hypothesis 6).

2.5.3. Match Effect

In Chapter Six, we turn to the investigation of the match effect hypotheses. As the last step in processing VAA information, users apply VAA output information by taking into account their prior knowledge and party preferences. The effect resulting from matching the VAA output with the user's prior party preferences is labeled the "match effect". Regarding the VAA match effect, VAA research primarily investigates voters' electoral preferences (Mahéo, 2016; Talukder et al., 2021). As far as the pre-voting population is concerned, we are more attentive to the development processes of political attitudes in general, as they have little or no political firsthand experience. It is to be expected that there will be a match effect on pre-voters' IPE, EPE, and political trust. Exposure to incongruent advice – advice that conflicts with the user's prior party preference – is likely to negatively influence IPE, EPE, and political trust. In addition, we refer to congruent advice when one's VAA advice is in line with one's prior party preference. We assume that congruent advice leads to higher IPE, EPE, and political trust. And lastly, we identify users who have no prior party preference, i.e., users who do not have any prior knowledge that could be used as heuristics to process their VAA result. They are rather exposed to so-called activating advice, as VAA output activates new cognition among those with less knowledge. The latter is expected to lead to higher IPE, EPE, and political trust.

First, we examine the match effects on pre-voters' IPE. We start from the premise that attitude-discrepant political messages have the potential to disempower the recipient (Taber &

Lodge, 2006). Theories in (social) psychology have demonstrated that an individual experiences cognitive dissonance in the event that two cognitions do not fit together psychologically, e.g., one of these is their belief that their most preferred political party is Party A, and the other is the realization through a VAA that they ideologically better match with Party B. Discomfort is triggered as the individual's belief is mismatched with the new information (Cacioppo et al., 1996; Festinger, 1957; Petty & Cacioppo, 1986). Receiving disconfirming advice tells the users that the preferred party is an incongruent choice (Talukder et al., 2021). Discrepant advice invalidates one's political views, knowledge, and competence, leading to a sense of discomfort. As a result, users may perceive that their party opinion was mistaken, which could disrupt their partisan views. The discomfort arising from incongruent advice may undermine users' confidence in their own political judgment, and hence challenge their sense of IPE.

In light of that, we claim that receiving voting advice that is incongruent to prior party preferences might signal that one's party opinion was wrong, and in turn disrupt one's partisan views. Hence, as users doubt their ability to form political opinions and comprehend politics, this may negatively impact their sense of IPE. We thus posit the following hypothesis: **"incongruent advice exposure has a negative impact on pre-voters' internal political efficacy"** (Hypothesis 7a).

Conversely, evidence from psychology suggests that attitude-confirming information tends to reinforce one's attitudes and boost confidence (Cacioppo et al., 1996; Festinger, 1957; Wicklund & Brehm, 1976). Metacognitive processes approaches indicate that attitude-consistent political messages drive attitude strength and self-validation (Taber & Lodge, 2006). Confirmation bias leads to thought confidence (i.e., confidence people have in their own thoughts) by clarifying one's own views. Attitude-consistent political messages have thus the potential to empower the recipient. Information in line with the recipient's prior beliefs reinforces these beliefs and one's attitudes. The "political profile" provided by the VAA serves as a validating cue, as political information confirming one's political views strengthens one's sense of political efficacy. Because VAAs convey opinion-matching information, they have the potential to impact one's own capacity to understand political matters and one's evaluation of the political system.

In brief, one can put forward that receiving advice that confirms pre-existing beliefs conveys the idea that the user's party opinions were accurate, which leads to the user's validation of their own political views, knowledge, and competence. In that sense, we hypothesize that

"congruent advice exposure has a positive impact on pre-voters' internal political efficacy" (Hypothesis 7b).

The last type of VAA advice, namely activating advice, applies to individuals who have no prior party opinions. It is very likely to encounter users who receive activating advice among pre-voters, as they might lack interest, ability, or experience about party politics. As individuals with no prior knowledge on political parties encounter information on that topic for the first time in the informational environment, new cognitions are inferred from these external cues (Kruglanski et al., 1993; Wood, 1982; Wood et al., 1985). In the absence of prior party opinion, VAA advice information hence constitutes the first informational stimuli on partisan closeness, and involves thinking about partisanship for the first time in their lives. Voting advice might thus activate new cognitions on political parties, and in turn lead to the formation of party opinion and understanding of the political landscape.

With an improved understanding of party politics, it is likely that individuals develop self-confidence in their ability to understand and to engage in politics. In sum, we expect that activating advice contributes to developing one's sense of IPE. We hypothesize that **"activating advice exposure has a positive impact on pre-voters' internal political efficacy"** (Hypothesis 7c).

As regards the match effects on EPE, we first investigate the effect of incongruent advice exposure. Zaller (1992) argues that individuals' response strategies to political information depend on their acceptance of the message. Individuals might feel discomfort as their beliefs are challenged with new information (Cacioppo et al., 1996; Festinger, 1957; Petty & Cacioppo, 1986). Receiving incongruent advice might signal to VAA users that their beliefs regarding parties do not match their actual proximity with parties in terms of policy opinions. When the output of a VAA suggests that the user's perception of party preferences and proximity might be wrong, they may latch onto the notion that they had a fallacious idea of party politics. Hence, users might be taken aback by incongruent advice, and doubt the effectiveness of the party system in responding to their interests. Incongruent VAA advice entails conflict, and creates dissonance and disequilibrium that disrupt one's partisan views. Consequently, individuals might revise their expectations as regards the quality of representative democracy and mitigate EPE.

In short, VAA advice that contradicts the user's perception of their party preferences might trigger doubt over the responsiveness of the party system. We thus posit that **"incongruent advice exposure has a negative impact on pre-voters' external political efficacy"** (Hypothesis 8a).

In contrast, as individuals are exposed to attitude-confirming signals in the media environment, they tend to view it as agreeable information, which in turns reinforces their attitudes or preferences (Cacioppo et al., 1996; Taber & Lodge, 2006). Research in psychology suggests that individuals are likely to interpret congruent information as supportive of their existing beliefs reinforcing their thought confidence (Cacioppo et al., 1996; Festinger, 1957; Wicklund & Brehm, 1976). These theoretical perspectives help us to better understand how VAA advice, when congruent with users' initial preferences, can play a role in shaping their perceptions of the party system's responsiveness and ultimately impact their sense of EPE. When a VAA user receives voting advice that matches their initial preferences as a result of having their policy opinion confronted with those of the party, they might understand it as a validation of their party preferences. Such attitude-consistent information on ideological congruence with parties might reinforce one's expectations as regards the quality of representative democracy, and spill over to perception of political actors' responsiveness.

Hence, when users realize that their opinions are valid, they might tend to perceive the party system's responsiveness in a positive light. We expect that congruent advice translates into EPE. We hypothesize that **"congruent advice exposure has a positive impact on pre-voters' external political efficacy"** (Hypothesis 8b).

On another note, some individuals have no opinion or preference regarding political parties before consulting a VAA. It is argued that individuals with no firsthand topic-specific cognitions – i.e., in the absence of topic-related internal cues – activate new cognitions as they face topic-specific signals in the informational environment – i.e., as they encounter topic-related external cues (Lau & Redlawsk, 2001; Lodge & Hamill, 1986; Wood, 1982). Pre-voters' thinking about political parties might indeed be activated by having a political mirror put in front of them. On that basis, they might be able to form partisan beliefs and evaluate their proximity with political parties' policy opinions. The VAA output has the potential to activate the cognition of those who were initially unaware of party politics.

In that way, as they gain insight on their partisanship, they might also become aware that citizens' preferences can be heard and relayed in the political arena thanks to party representation. Hence, this might trigger the feeling that the political system takes heed of citizens' concerns. In sum, we hypothesize that **"activating advice exposure has a positive impact on pre-voters' external political efficacy"** (Hypothesis 8c).

Lastly, we turn to investigate the set of hypotheses about the match effects on political trust. It must be noted that we consider the same evidence and use similar reasoning to infer the match effect hypotheses on political trust as on EPE, as developed above. It is not surprising that we find common ground in the cognitive processes at play when processing belief-(dis)confirming signals in the informational environment for both EPE and political trust, as they present conceptual similarities (see Section 2.2 for a discussion of the concepts of political efficacy and trust). Both pertain to the notion of institutional responsiveness and imply citizens' evaluation of institutions' performances (Craig, 1979; Craig et al., 1990; Sharoni, 2012). On the one hand, EPE refers to the evaluation of institutions' responsiveness to citizens' political actions or claims. On the other hand, political trust captures citizens' evaluation of political institutions to act for the common good.

When the informational environment conflicts with previously held attitudes, an individual might realize that they had certain misconceptions, and in turn feel thrown off by attitude-discrepant information (Cacioppo et al., 1996; Festinger, 1957; Petty & Cacioppo, 1986). Incongruent advice might signal that one's idea on political parties was skewed, which might lead the user to feel disconcerted by the information provided. It is indeed found that discontent or negative experience translates into distrust or mistrust, as it spills over to influence how people think about representative bodies (Citrin & Stoker, 2018). As a consequence, individuals might revise their expectations as regards the quality of representative democracy and mitigate trust towards representative bodies.

In short, as users discover that their opinions are not supported, this may lead them to question their beliefs about the political system, and to an erosion of trust in political actors. We thus posit that **"incongruent advice exposure has a negative impact on pre-voters' political trust"** (Hypothesis 9a).

In contrast, regarding confirming information impact, we recognize that individuals tend to be complacent about signals that are in line with their a priori opinions (Cacioppo et al., 1996; Taber & Lodge, 2006). When people encounter information that aligns with their existing beliefs, confirmation bias reinforces and strengthens those beliefs, leading them to be sympathetic towards such information. This cognitive shortcut explains that individuals tend to accept information when it confirms their prior beliefs, which tends to strengthen those beliefs (Cacioppo et al., 1996; Festinger, 1957; Taber & Lodge, 2006). Building on this theoretical understanding, we propose that receiving advice that aligns with an individual's party preference may lead to a positive appraisal of

the representative system. Attitude consistent information on ideological congruence with parties reinforces one's expectations as regards the quality of representative democracy, and spills over to political trust.

On that basis, we claim that congruent advice might flatter individuals about their party preference, and hence convey the perception that the representative system is adapted to them and worth trusting. As such, congruent advice might strengthen users' beliefs in the responsiveness of the system to their political preferences, which contribute to bolstering their political trust. We posit that **"congruent advice exposure has a positive impact on pre-voters' political trust"** (Hypothesis 9b).

Notwithstanding that many pre-voters have no idea about their party preference, it is meaningful to examine the process at play when those pupils reason about information regarding their placement in the party landscape. For some inexperienced pre-voters, it may be the first time they think about their party preferences when discovering their personalized political profile. Individuals who do not have any internal cue – i.e., no prior party preference – can only rely on the external cue – i.e., voting advice – to form an opinion (Lau & Redlawsk, 2001; Lodge & Hamill, 1986). VAA users who do not have any prior informational foundation cannot use any cognitive shortcuts to process information on their party placement. Individuals with no prior knowledge are found to be less resistant to informational influence, as they cannot effectively counter-argue the message (Wood, 1982). Hence, they are found to form an opinion consistent with the message position (Kruglanski et al., 1993; Wood et al., 1985). For these unknowledgeable users, the VAA might allow them to realize that we find common ground between parties and citizens' concerns.

Therefore, as individuals get a first idea of their opinion alignment with political parties, they might come to realize that the party system is designed to align with the opinions of its citizens, and therefore, it is considered legitimate. Altogether, activating advice is expected to positively influence political trust. We hypothesize that **"activating advice exposure has a positive impact on pre-voters' political trust"** (Hypothesis 9c).

2.5.4. The Medium-Term Effects

Our study examines both immediate and medium-term effects of VAA use. We are interested in whether using a VAA can also lead to lasting changes. The two first DVs, IPE and EPE, were measured at three time points: one month before intervention, right after intervention, and about one month after intervention. Political trust was measured at pre-intervention and one month after intervention, but not immediately after intervention. We further develop the methodology for data collection in the following chapter. Therefore, we can assess medium-term statements, advice, and match effects on the three DVs. The second research question touches upon the medium-term effects of VAAs and is formulated as follows: "To what extent does a VAA have a lasting impact on pre-voters' political efficacy and trust?" (RQ2)

The question of the lasting effects of VAAs has been neglected in the existing literature. Scholars are indeed mostly interested in VAA impact on voters' behaviors during electoral campaigns, especially on turnout and vote choice (see Table 1 for an overview of VAA effect studies). In addition, one can argue that it would be unlikely to find lasting effects of such a brief activity as the use of a VAA. Yet, we expect to find a medium-term effect of early-life VAA exposure in a classroom setting. The following paragraphs discuss the four processes that might affect lasting VAA effects: collective learning, individual learning, maturation, and real-life events.

First, it must be noted that VAA usage is an individual activity. In Sections 2.5.1 to 2.5.3, we develop our hypotheses on statement, advice, and match effects resulting from individual use of a VAA. Yet, VAA intervention took place in a classroom setting, where group discussion can emerge around this material. Using VAAs in classrooms should offer many learning opportunities. VAA designers aim to provide tailored political learning tools that allow teachers to inform youth conveniently, efficiently, and engagingly. Pupils can discuss the parties' positions and reflect on various political issues as well. Teachers who appeal to the VAA in the classroom must provide their pupils with further guidance in processing their voting advice, and organize classroom discussions and debates so as not to leave pupils on their own when they have to reason on VAA information.

Therefore, VAAs can be used as a classroom activity for citizenship education. In Section 2.3.3 above, we extensively discuss both direct and indirect forms of citizenship education used to yield pupils' sense of political efficacy and trust. On the one hand, VAAs might be viewed as a means of formal instruction, i.e., the direct form of citizenship education. VAAs can be used as material for knowledge transfer from the teacher to the pupils in the classroom. VAA statements may provide knowledge on political issues, and VAA advice may provide instruction on political

parties and the position they hold. It may take time and consideration for such an inexperienced population to make sense of political information, gain new knowledge, and build up political attitudes, with a little help from the teacher. On the other hand, a VAA might also be a source of classroom interaction, i.e., the indirect form of citizenship education. VAA use might trigger democratically oriented interaction patterns within the classroom environment. It is expected that VAA use opens discussion and the expression of opinion, as individuals might feel the urge to communicate their impressions upon having a political mirror being put in front of them, or might want to hear about those of their fellow classmates. In this case, VAA use goes beyond being an individual activity as it drives a collective classroom dynamic.

Second, in addition to collective learning processes, we identify individual learning as a process of tracking changes in participants over time. Participants might also engage in individual reflection on VAA intervention at post-exposure. Hence, they might gain knowledge during the study. Participants' individual learning after intervention influences their attitudes in the medium term. Hence, any change in the DV in the medium run can also be due to a gain in political knowledge, as a VAA might provide food for thought for individual political thinking.

Thirdly, we also expect to find VAA effects in the medium run because of maturation. The latter refers to the changes that might occur in time just because an individual grows older and cognitively develops within their real-life environment (Krauth, 2000). It can be viewed as a threat to the internal validity of the findings in an experimental design (see Section 3.6 in the following chapter for further discussion on internal validity). Individuals may change in the time interval between the measurements, not only due to the experimental situation but also for physical, developmental, emotional, mental, or socio-environmental reasons (Krauth, 2000). As all participants, even those not exposed to a VAA, grow, learn, and develop during the months of the experiment, we might observe gains in the DVs among all intervention groups over time. In addition, one may expect that the VAA's impact on efficacy and trust will only take place after some time to digest the information and make sense of it.

Lastly, our experiment in the field is not free of influence from external events. Current affairs and real-life events can also influence the results of the study as they introduce biases or confounding factors. External events might affect participants and confound the results. For example, we might expect an influence on participants' political attitudes due to the outbreak of COVID-19 and the school closures that occurred during the study at post-intervention. Therefore, the control group serves as the standard to which comparisons can be made to extricate the impact of extraneous confounding factors on outcomes (Creswell & Creswell, 2018). Current affairs,

among them a health crisis, can be regarded as variables that might interfere with or obscure the relationship between our independent and dependent variables.

2.5.5. Addressing Inequalities

In addition to the above, our research fills a critical gap in the existing research by shedding light on the potential of VAAs to bridge political inequalities. Hence, we raise the question of disparities in democratic attitudes among pre-voters. Just like the adult population, pre-voters are a heterogeneous group among which socio-economic or political attributes are not equally distributed. The most disadvantaged social categories are more likely to be the least knowledgeable and engaged in politics, and to have little sense of IPE (Beaumont, 2011), a limited sense of EPE (Beaumont, 2011; Chamberlain, 2013), as well as a mistrust towards political institutions (Dalton, 2004; Norris, 2011; Verba et al., 1995). These factors derive indeed from one's resources and socio-economic status (Burns et al., 2001; Verba et al., 1995). In this respect, school and citizenship education activities are seen as a medium of choice to compensate for inequalities that characterize members of society from an early age (Campbell, 2008). The educational system must provide equal opportunities to integrate young citizens into society and allow them to find their place in the social structure (Kavadias et al., 2017). Achieving equal opportunity in political learning results in long-standing patterns of political engagement (Maurissen, 2018). All segments of the population must leave the school system as "empowered citizens" willing to engage in politics, showing support for political institutions.

Yet, citizenship education affects young people differently depending on their characteristics, such as their political attributes. One's individual background influences the pull of political learning. Those who have a more privileged background are more likely to benefit from the standard curriculum (Bourdieu, 1970; Draelants, 2019, see also Section 2.3, "Political Socialization Processes"). However, by implementing VAAs in an education program, we aim to counteract the shortcomings of regular programs. We ask whether the VAA could serve as a lever to correct inequalities in terms of IPE, EPE, and political trust. The last question we are raising is this: To what extent is there a difference in VAA effect based on SES? (RQ3).

VAAs might have differentiated effects based on pre-voters' background characteristics. Over the years, more and more VAA studies have considered users' backgrounds in investigating the effects of these apps (see for instance Germann et al., 2022, 2023; Kamoen & Liebrecht, 2022; Kamoen et al., 2022; Kleinnijenhuis et al., 2017; Mahéo, 2017; Talukder et al., 2021; Vassil, 2011).

As a political learning activity, VAAs must stimulate the sense of efficacy and trust of all users. We expect the VAA to benefit all pre-voters, not only those who begin with some political sense. Mahéo's (2017) study demonstrates that Voting Advice Applications fulfill their purpose of getting new people to psychologically engage in electoral politics. Evidence shows that lower-educated users benefit the most from the VAAs, as they stimulate attentiveness to electoral campaigns. VAAs allow reducing political inequalities, as individuals with lower levels of political resources make greater gains in terms of campaign attentiveness. These findings have major implications for VAA designers, as these interactive apps are primarily made to inform and educate citizens during electoral campaigns. The idea is to present political information that usually seems overly complex to a less privileged population in an attractive and interactive way, to achieve the goal of mobilizing those who are usually demobilized. Hence, one might expect that underprivileged pre-voters make greater gains from VAA statements or advice exposure in terms of political efficacy and trust.

In addition, underprivileged pre-voters, being likely to have less political resources, might have less prior political knowledge to process the information of a VAA. Those who have no knowledge to take cues when they encounter political information can only rely on and take cues from signals in the informational environment (Lau & Redlawsk, 2001; Lodge & Hamill, 1986; Wood, 1982). As they are less knowledgeable, they are more likely to use the VAA match information as a validating cue (Luskin, 1990). The cognitive processes involved as one is dealing with matching information of a VAA imply that the tool might be particularly adequate to foster the thinking and judgments of the most disadvantaged social categories. It is likely that the match effect of VAAs is even more compelling for pupils with few political resources.

Nevertheless, it might be argued that pre-voters with few or no political resources might not be skilled or literate enough to process VAA information. On the one hand, if they are not able to genuinely use a VAA, they might not be able to learn from it efficiently. Hence, they make no gains in terms of political efficacy and trust. On the other hand, the effect of VAAs might be detrimental for those underprivileged young users if they find themselves lost when confronted with a tool that seems too complicated to understand and use. In turn, politics might appear to be an even more blurry topic if the VAA fails to make the topic intelligible and accessible to them. In sum, the research question remains open since several perspectives are drawn on the varying effects of VAAs across social groups: using VAAs might either disproportionately benefit or hurt the sense of political efficacy or trust of pre-voters from underprivileged backgrounds; it might also simply not influence underprivileged pre-voters.

In the present chapter, we have discussed and reviewed the literature that shaped the development of our research questions and hypotheses. In the following chapter, we present the methods used to address our research objectives. In turn, we empirically investigate the first set of research questions and hypotheses related to the statement effect in Chapter Four. We examine the advice and match effects in Chapter Five and Chapter Six. In the concluding chapter of the thesis, we outline the main findings and contributions of the present study.

Chapter Three: Research Methods & Experimental Design

3.1. Introduction

In the previous chapters, we addressed the background and objectives of the study. We extensively developed both constructs of internal and external political efficacy, as well as political trust. We also discussed the political socialization and Voting Advice Applications literature. This led us to form research questions and hypotheses (see Chapter Two, Section 2.5). This chapter presents the research design and methodology that was employed during the study to explore our research questions and hypotheses. We empirically study the development of youths' political efficacy and trust regarding VAAs, keeping it with the great majority of VAA effect studies that have adopted quantitative methods. We set up an original and replicable mixed experimental design within and between subjects. In addition, the three-wave design allows controlling for pre- and post-exposure measures of the IVs and DVs.

However, VAA research suffers from a recurring sample self-selection bias. VAAs are freely available online during election campaigns and usually attract, to a large degree, citizens with an already very high interest in politics. The typical VAA user has a profile similar to the average Internet user: young, man, higher educated, and with an above-average income (Fivaz & Nadig, 2010). If the aim is to claim the causal effect using VAAs, a comparison of VAA users (experimental treatment group) to non-users (control group) should be made (Mahéo, 2016). In this case, the research aims to evaluate the potential of VAAs to affect pre-voting citizens' sense of political efficacy. An experiment in the field is thus the most reliable and soundest way to actually empirically isolate the effects of VAA usage, free of other confounding factors (Hooghe et al., 2010). Since the target population consists of pre-voting citizens, the intervention can be tested in classrooms. Unlike research conducted in decontextualized laboratory settings, classroom settings are relevant to natural contexts and the educational process.

Research on youth and political socialization highlighted that the period between the ages of 16 and 18 is a key time for citizenship education: During this period just under the legal voting age, adolescents – considered as pre-voters – create their own opinions, are not as sensitive to the opinions of their friends anymore, and will soon vote (Quintelier, 2008). Furthermore, studying political behaviors and the attitudes of high school pupils should hold great interest since they are

the target audience for citizenship courses: Young people are expected to grow into adult citizens who regularly follow public affairs, cast informed votes, and sometimes take actions to influence decisions (Hahn, 1999; Niemi & Hepburn, 1995).

In that sense, our study offers a novel perspective on VAA effects by contributing an experimental setting. The present chapter showcases the methodology used to implement this research project. An original experimental design aims to demonstrate the effects of a Voting Advice Application, *le Test électoral éducatif*, on the specific population of pre-voters and their sense of political efficacy and trust in a context of newly established citizenship education. The experimental approach allows us to disentangle the different types of VAA effects. We identify three kinds of VAA effects (Kleinnijenhuis et al., 2017): the statement, advice, and match effect. We empirically distinguish one effect from another by setting up two intervention groups and one control group. The first intervention group was assigned to use the VAA, i.e., pupils in this group were assigned to give their opinion on 35 policy statements and received voting advice as a result. The first intervention group allows us to examine the advice effect. The second intervention group allows us to assess the statement effect, as they had to answer the same 35 policy statements without being exposed to VAA output. In addition, we use observational data from the first group to assess the match effects. We examine the effects of advice congruence on the DVs, as some users receive advice that confirms their a priori party preferences and others receive incongruent advice. In addition, we consider activating advice for VAA users who do not have any prior party opinion on the Top 1 party advised by the VAA.

The experimental design is detailed in this chapter. We consider the data collection approach (see Section 3.2), data material and measurements (see Section 3.3), the data analysis procedures (see Section 3.4), and the validity of the VAA for pre-voters' use (see Section 3.5). We conclude this chapter by reviewing and discussing the inherent biases and limitations to our research goals in Section 3.6.

3.2. Data Collection

This section is focused on developing the research design for data collection. We used quantitative and experimental research methods to assess the effects of VAAs on pre-voters' sense of political efficacy and trust. In order to isolate the VAA effects from other variables in a natural classroom setting, we set up an original and replicable experimental protocol. This three-group pre-test/post-test design lies between survey experiments and experiments in the field: A survey treatment is part of the field intervention which has an experimental treatment embedded. This protocol has been validated by an Ethics Committee of the UCLouvain (see also a detailed discussion of the ethical considerations in the appendix). The experiment takes place in natural classroom or computer room settings with 5th- and 6th-year secondary school pupils across Wallonia.

Where lab experiments distort natural behaviors and fail to accurately simulate real-life situations, experiments in the field genuinely integrate into natural settings. Experimental approaches are the most suitable to answer causal research questions. A rigorous experimental design makes it possible to effectively establish causal relationships between variables (Slavin, 1999). In turn, cause can be confidently associated with effect in independent measures design. The latter design method consists in taking a measure from a control group and comparing that against an experimental group who have received some sort of treatment (O'Donnell, 2005). The control provides the benchmark from which change can be assessed (Clark et al., 2019). The independent variable, or the levels in the IV, is the key component that differs between conditions. Moreover, pilot studies were conducted to ensure the feasibility and robustness of the definitive experiment. We discuss the pilot tests methodology in the appendix.

3.2.1. Participants, Sampling, and Timescale

This study addresses a research void that existed in the literature regarding VAA effects on the population under study. The participants in this study are pupils in their 5th or 6th (final) year of high school, aged between 16 and 18. They are either enrolled in technical education with options in humanities or management subjects, or in general education. Thus, the education of the pupils included in the study is either general education, focused on theory and general knowledge in preparation for the transition to higher education, or technical studies, focused on practice and technical teaching, preparing pupils for a vocation or further studies.

Pupils in vocational school and those in technical education with specializations other than humanities are thus excluded. The training of the excluded pupils is heavily focused on practice, and provides direct access to a profession at the end of the course of study. Herein lies the main difference between students in technical education following a humanities specialization (e.g., economy or social science) and those in other specializations (e.g., applied science, construction, industry, or agronomy). In addition, teachers who might be interested in such an intervention[4] have very few hours of class time with students in these tracks. Citizenship education is therefore overlooked, and the demand for teaching material is limited. We ensure greater homogeneity in the sample by making the distinction and rejecting specializations that favor career entry rather than preparing for the possibility of enrolling in higher education. As a drawback, sample homogeneity comes at the expense of the generalizability of our findings to all school contexts. We further address the issues of generalization in Section 3.6, as a conclusion to the present chapter.

The recruitment process described below is intended to gain access to the population of interest, and in turn to obtain a large and homogenous sample to maximize our ability to reject the null hypothesis. The recruitment process was done by contacting school principals directly by email. Those who welcomed my proposal forwarded my request to teachers in their schools. After screening teacher replies, the recruitment retained 20 teachers before the start of the first wave. With only one teacher dropping out, the number of participating pupils in the first wave totalled 791. The study, therefore, continued with these pupils and 19 teachers from 19 different schools; that is to say that there was only one participating teacher per school. Hence, we interchangeably use the terms "teacher-level" or "school-level" in the remainder of this thesis.

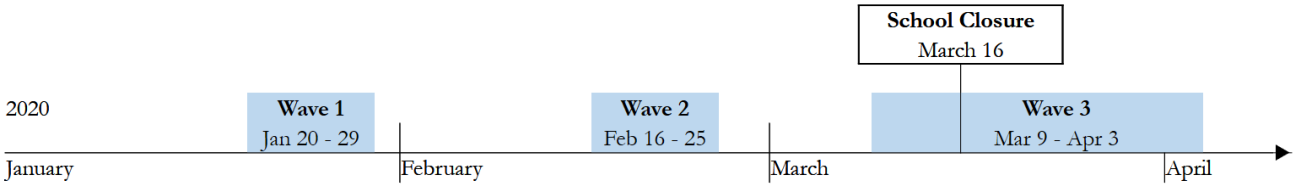
This experiment was carried out in a natural classroom setting for the sake of external validity of the study results. The filling-in of questionnaires and the performance of one of the three computer tasks took place in the classroom or the computer room during the class hours of the teachers recruited across Wallonia. The 19 different participating schools are located in the five Walloon provinces, in both rural and urban areas.

This experimental research also involved the collection of data at different times. Figure 5 below provides a visualization of the experiment timeline. Data collection began at the start of the second semester of the 2019–2020 school year, which provides realistic school learning conditions. The first questionnaire (Wave 1) was carried out from January 20–29, 2020. About a month later,

[4] The subjects in which education in philosophy and citizenship is delivered are typically geography, French, economics, and social training. These subjects are covered in these students' core curriculum but not in their specialization curriculum.

from February 17–25, the second wave took place. Pupils filled out a questionnaire and performed one of three computer tasks. And last, as regards the third wave, the last survey and debriefing in the classroom took place from March 9, and continued remotely until April 3, 2020. About two months elapsed between the launch of the first questionnaire and the debriefing.

Figure 5. Experiment Timeline



Note: Author's own elaboration.

This study addresses another gap in the existing research by providing new insights into VAA effects outside electoral campaign periods. Although the experiment takes place outside of the electoral campaign period, political issues were nonetheless a hot topic at the beginning of 2020. The first trimester of 2020 was marked by numerous attempts to form a federal government, as elections had been held in May 2019. There was also considerable uncertainty as to whether a new election would be held if no government were to be formed. Declarations from both Flemish and francophone political parties are widely covered in the media since they must work together to form a federal government. In such a puzzling time, teachers genuinely wish to provide their pupils with the tools to decipher reams of complex information.

In addition to this Belgian context, the experiment is also marked by a major international crisis. The outbreak of COVID-19 put the world under lockdown in March 2020, as this experiment was underway. Schools in the French community of Belgium closed as of March 16 on account of measures to contain the spread of Covid-19. One might reasonably expect that this major event would impact citizens' political attitudes. We now have empirical evidence that Belgian young people experienced mental distress during the pandemic (Rens et al., 2021), and that the general population of adults has shown eroding support for the government (Massart et al., 2021). Hence, we must keep in mind that these events might influence the attitudinal variables we measured in Wave 3.

In consequence, data collection was delayed and the methodology was adapted for the third wave of the study. The final survey and classroom debriefing began on March 9 (follow-up, Wave 3). I was present in the schools when pupils completed the short post-intervention follow-up survey, and then personally closed out their participation in the study with a debriefing and question-and-answer session. However, after a week of classroom data collection, schools in the French community of Belgium closed as of March 16. Data collection continued remotely, and

respondents completed their final questionnaire from home. Thus, the third wave of data collection runs from March 9 to April 3.

As a result, the third wave of this study suffers from a high dropout rate, as teachers or some pupils were variously unreachable following the school closures. Since neither the teachers nor I could monitor the completion of the questionnaires in person, we initiated a new approach to identifying respondents. To that end, we included an additional identification item in the last questionnaire (all questionnaires are provided in the appendix). For teachers to identify which of their pupils had completed their last questionnaire without compromising the anonymity of the respondents to the researcher, participants were asked to provide an identifier code.[5]

However, we did not hear back from two teachers whose 34 and 44 pupils were assigned to the main intervention group, despite reminders. The great majority of the participating teachers complied with the changing requirements, but some teachers did not hear from some of their pupils regarding requests related to my study, or to other school activities. The three intervention groups thus show slight variations in several socio-demographic characteristics' pre-intervention assessment because of attrition (see Table 3 below). The imbalances observed between groups might be attributed to the small sample size or the clustered randomization method (see Section 3.2.2 for a discussion on randomization).

Table 3 displays the average of reported answers for respondents who participated in all three waves. A total of 401 respondents were retained, of whom a small majority were women (56%). Respondents have a rather high socio-economic status, as 79% of respondents reported that their mother has a higher education degree. Overall, the sample shows a mean score of 4.49 (*SD* = .96) on a scale of 1–6 of financial and material conditions at home. 80% of the participants are enrolled in the general track, and the remaining 20% are pursuing a technical education. 54% are in the last year of secondary school (46% are in the fifth year of secondary school). Participating schools show a rather high SES, as the sample shows a mean score of 3.89 (*SD* = .81) on the 1–5 school SES scale.

[5] The following prompt was used (see also questionnaires in Appendix B): "First and foremost, due to the exceptional circumstances, I will ask you to identify yourself via an identifier code. I will forward the list of codes of the completed questionnaires to your teacher. For example: The teacher who asked me to complete this questionnaire is called Mrs. Van Migem (V); My name is Laura (L) Uyttendaele (U) and my birthday is May 24th (4) -> my identifier code is VLU4 : The first letter of the teacher's last name: [Text entry]; The first letter of your first name: [Text entry]; The first letter of your last name: [Text entry]; The last digit of your birthday: [Text entry]; Your identifier code is, therefore : [Text entry]"

Table 3. Description of the Sample

Intervention group	Control	Statement	Advice	Total						*F*-test
	Mean	Mean	Mean	Mean	*N*	*SD*	Min	Max	% missing	(*p*-value)
Baseline IPE	2.99	3.07	2.92	3	400	.95	1	5	0.25%	.486
Baseline EPE	2.47	2.39	2.56	2.46	400	.61	1	4.2	0.25%	.094
Baseline Political Trust	4.23	4.18	4.28	4.22	250	1.76	1	8.33	37.5%	.934
Gender	0.50	0.58	0.60	0.56	401	.50	0 (man)	1 (woman)	0%	.231
Man (in percentages)	50	42	40	44	176					
Woman(in percentages)	50	58	60	56	225					
Mother's highest diploma	0.83	0.80	0.69	0.79	394	.41	0 (secondary)	1 (higher ed)	1.7%	.032
Secondary Education (and below)	17	20	31	21	83					
Higher Education (in percentages)	83	80	69	79	311					
Fin. & Mat. Conditions	4.53	4.49	4.41	4.49	399	.96	1	6	0.5%	.613
Educational Track	0.78	0.86	0.71	0.80	401	.40	0 (technical)	1 (general)	0%	.018
Technical Track (in percentages)	22	14	29	20	80					
General Track (in percentages)	78	86	71	80	321					
School year	5.37	5.61	5.69	5.54	401	.50	5	6	0%	<.001
Fifth Year (in percentages)	63	39	31	46	184					
Sixth Year (in percentages)	37	61	69	54	217					
Political Discussion	8.99	9.29	8.53	9	397	3.18	4	18	1%	.190
Political Interest	3.80	4.34	3.74	4.00	401	2.75	0	10	0%	.133
School SES	3.74	3.76	4.37	3.89	401	.81	2	5	0%	<.001

Note: All measurements were taken at pre-intervention except for School SES information that relies on teachers' survey data.

As regards the baseline level on each DV, we do not find any significant difference between intervention groups in their initial level of IPE and political trust. Yet, we find baseline differences in terms of EPE (F (2, 397) = 2.381; p = .094). Table 4 below displays Tukey's HSD Test for multiple comparisons for each between-group imbalance. The advice group has a slight edge over the baseline EPE (Mean difference = .174, p = .079). In addition, pupils assigned to the advice exposure group are found to report slightly lower SES than the control group based on the mother's highest diploma (Mean difference = -.141, p = .026). Regarding the educational track, pupils enrolled in technical education tend to be slightly overrepresented in the advice group compared to the statement group (Mean difference = -.146, p = .017). Regarding school year, pupils enrolled in the sixth year tend to be slightly overrepresented in the control group compared to both the statement (Mean difference = .245, p <.001) and advice groups (Mean difference = .326, p <.001). As a last factor of imbalance, we identify school SES. Pupils attributed to the advice group come from slightly more advantaged school backgrounds compared to both the control (Mean difference = .635, p <.001) and statement groups (Mean difference = .609, p <.001).

Table 4. Between-Group Comparisons for Imbalances

	Intervention group	Mean Difference	p
Baseline EPE	Statement vs Control	-.083	.460
	Advice vs Control	.091	.498
	Advice vs Statement	.174+	.079
Mother's Level of Education	Statement vs Control	-.034	.738
	Advice vs Control	-.141*	.026
	Advice vs Statement	-.107	.120
Educational Track	Statement vs Control	.082	.170
	Advice vs Control	-.063	.456
	Advice vs Statement	-.146*	.017
School Year	Statement vs Control	-.245*	<.001
	Advice vs Control	-.326*	<.001
	Advice vs Statement	.081	.410
School SES	Statement vs Control	.026	.954
	Advice vs Control	.635*	<.001
	Advice vs Statement	.609*	<.001

Notes: * The mean difference is significant at the 0.05 level.
+ The mean difference is significant at the 0.01 level.

3.2.2. Instruments

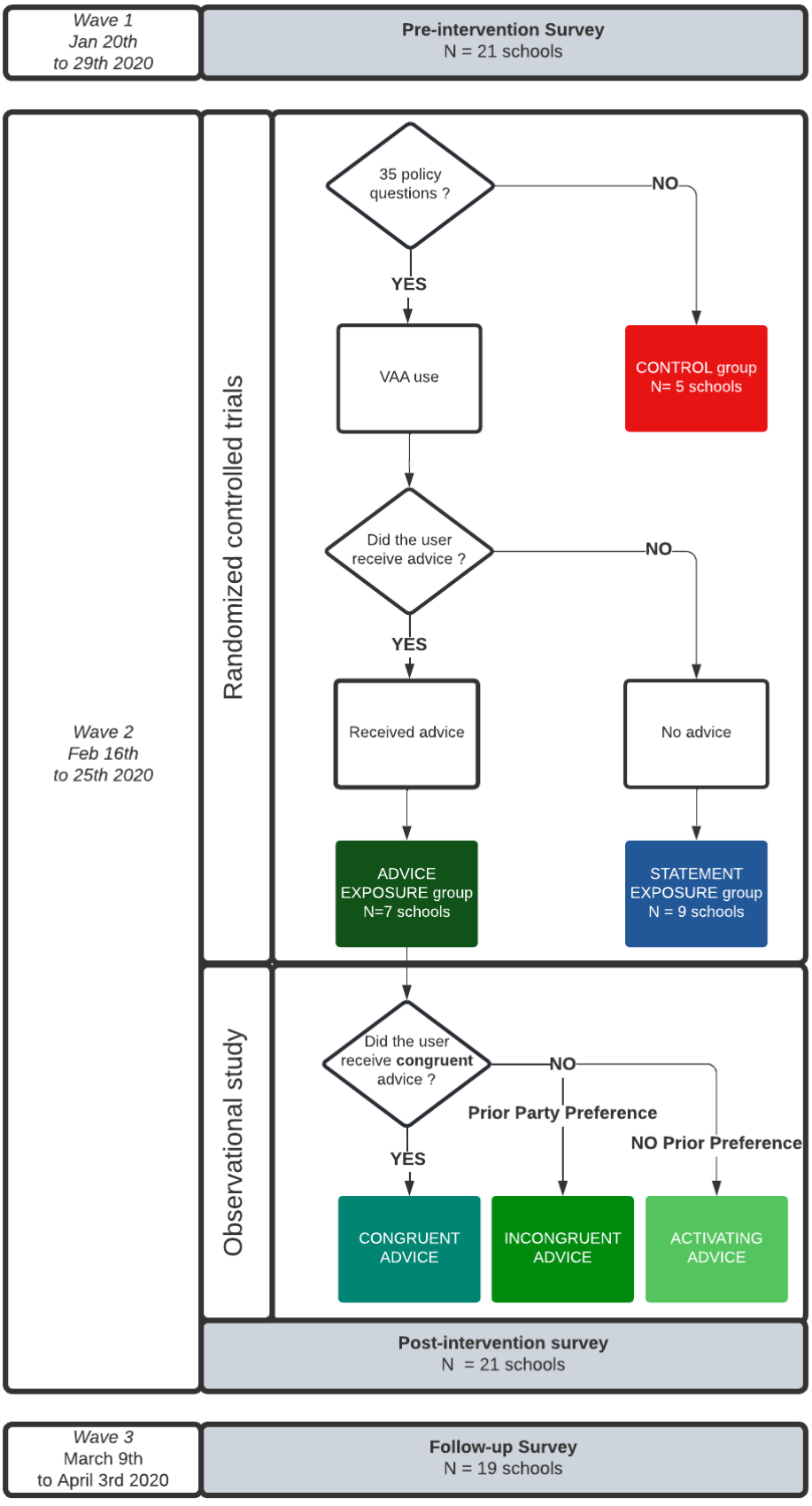
In conducting the study, we collected primary data to get in-depth information on VAA effects on pre-voters' political efficacy and trust. The data was extracted thanks to web-based questionnaires in Qualtrics. Figure 6 below displays the research design implemented to run this research. Data collection was carried out in three waves, from January 20 to April 3, 2020 in the classroom or computer room, then remotely as a result of the school closures due to the COVID-19 crisis. Multi-wave data collection allows for comparison and studying the changes in pre- and post-intervention attitudes.

The first questionnaire (referred to as the pre-intervention survey, Wave 1 in Figure 6) was carried out from January 20–29, 2020. 19 schools participated in the pre-intervention survey (*N* classes = 51, *N* pupils = 790). Participants were invited to fill in a questionnaire on their individual background and political attributes. The pre-intervention survey allows the researcher to measure baseline levels for each independent, dependent, or confounding variable.

About a month later, from February 17–21, pupils performed one of the three computer tasks and filled out a post-intervention questionnaire (referred to as the post-intervention survey in Figure 6). The second wave consists of receiving one of the interventions. The participants in the randomized controlled trials are assigned either to the main intervention group, i.e., the "advice effect" group, the "statement effect" group, or the control group. In practice, teachers introduced the survey and intervention at the beginning of their one- or two-hour class. At all times, teachers were asked to present interventions as individual tasks. After performing the task they were assigned to, all participants then participated in a short survey to measure post-intervention levels of political efficacy. They were also asked to appraise the task they had just performed. A total of 692 respondents took part in Wave 2 (*N* classes = 51, *N* teachers/schools = 19).

Educational interventions are often geared to entire classes or whole schools rather than individual students. Thus, we used a cluster random assignment of intervention at the teacher level. We used this procedure in which clusters of individuals are assigned to one level of the IV so that each cluster has an equal chance of experiencing any of the IV levels (Adams & Lawrence, 2019, p. 288). We made a random cluster assignment in which classes of students were assigned to one of the three tasks. Randomization was performed through an automated Excel spreadsheet.

Figure 6. Experimental Design



Note: Author's own elaboration.

Yet, clustered randomization has some drawbacks. It may result in loss of statistical power compared to individual randomization to achieve the same level of precision in estimating intervention effects. It may also result in unequal cluster sizes, which can affect the balance of covariates and confounders between intervention groups. We carefully consider these drawbacks and address them to minimize the risk of type I errors.[6] To tackle this issue, we proceed to balance checking to locate and underline the imbalances across the intervention groups with respect to baseline characteristics. Hence, we include the unbalance factors as control variables in our empirical analyses (see Tables 3 and 4 above for balance checks).

By assigning conditions at the teacher level instead of the individual/pupil level, threats to internal validity are minimized. Internal validity threats are "experimental procedures, treatments, or experiences of the participants that threaten the researcher's ability to draw correct inferences from the data about the population in an experiment" (Creswell & Creswell, 2018, pp. 170–71). The threats to internal validity due to experiences or environmental factors, such as history or maturation threats, can be eliminated or controlled in a group design by keeping everything except the independent variable constant across the groups (Adams & Lawrence, 2019). Furthermore, we prevent the diffusion of treatment or information on the different existing conditions that occur when participants assigned to different groups impact each other, which in turn blurs the differences between groups. In this way, participants from the same school are not kept from interacting with each other throughout the study. but any contact with participants who have been subjected to another experimental condition is thus avoided. We further discuss the internal validity of this study in Section 3.6 below. We have also ensured that the length of the intervention be kept as constant as possible across independent variable levels.

Pupils assigned to the first group were tasked with visiting the *test électoral éducatif* website in the class/computer room in Wave 2. This group is referred to as the "advice effect" group in Figure 6 above.[7] Pupils in this group were invited to give their opinion (agree/disagree) on the 35

[6] Type I error, also known as false positive, occurs when the researcher concludes that there is a significant effect or relationship between variables when in fact there is not.

[7] The following instructions were given in the questionnaire:
"Now you are going to do a short computer task (or you probably did it before the survey). Thanks to this website, the *test électoral éducatif*, you will be able to find out which parties you are closest to or furthest from. You will have to give your opinion (agree/disagree) on a series of issues that concern you as a young person, that affect your daily life, or that of your family and friends.
You will be redirected to the *test électoral éducatif* website by clicking on the link below. Be sure to keep both websites open (the survey website and the *test électoral éducatif* website) once you have obtained your test result. You can also write down your result (a list of seven French-speaking Belgian parties) on a piece of paper to make sure you don't lose your list (or take a screenshot). You will have to report your result below.
Try to take a position on as many statements as possible; there is no right or wrong answer!

statements of the *Test électoral fédéral,* and obtained as a result their "voting advice" ranking in ideological proximity order the seven French-speaking parties available in the VAA (cdH, Ecolo, DéFI, MR, PP, PS, and PTB). The pupils of this group have access to all the functionalities of the tool, such as displaying the arguments in favor and against each statement, or obtaining the definition of certain concepts considered more difficult to understand by a young audience (e.g., right to family reunification, taxes on profits, sale of share, etc.). A total of seven schools, 20 classes, and 228 pupils compose the "advice effect" group at Wave 2. However, only 197 of them participated in Wave 1, and 126 of them participated in Wave 3. 92 pupils from this group participated in all three waves. The attrition in this group is addressed in Section 3.2.1 above.

As documented in Figure 6 above, participants from this group also participated in an observational study. We look at whether pre-voters received congruent advice (the first recommended party corresponds to a highly ranked party according to a user's initial preferences), incongruent advice (the first recommended party does not correspond to a highly ranked party), or activating advice (the user did not report any prior opinion on the first recommended party). We can assess the VAA match effect, i.e., advice congruence, as we scrutinize individuals' initial party preference (measured at Wave 1) compared to the (declared) advice given by the VAA. We further develop the methodology to measure advice congruence in Section 3.3.4, "Match Effect" below.

The second group of pupils was asked to position themselves individually on the same 35 political issues. However, the pupils in this group, the "statement effect" group, do not receive voting advice as an outcome. This intervention is presented to them as an opinion survey on public policies that affect their daily lives or those of their relatives.[8] Pupils in this group do not benefit from the interactive effect of the VAA. In this way, and by comparing these first two groups, we can verify whether any change in attitude is due to the "VAA advice effect", comprised as the positioning on 35 statements, use of the VAA features, and receiving voting advice, or to the "VAA statement effect", i.e., the mere information stimulus contained in the political statements of the VAA. A total of seven schools, 15 classes, and 234 pupils compose the "statement effect" group

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If the survey page closes when you visit the other website, you can still access it from where you left off by typing the survey link into your browser again.
Access the *test électoral éducatif* or copy-and-paste the following link into another page/tab: https://testelectoraleducatif.be/#/federal/proposition/1"

[8] The following instructions were given in the questionnaire:
"You are now going to perform a short computer task. You will have to give your opinion (agree/disagree) on a series of issues that concern you as a young person, that affect your daily life, or that of your family and friends. Here is an example of a statement that will be presented to you: 'The maximum speed limit on national roads (90 km/h) should be reduced'. If for any reason you agree with a proposal, indicate the answer 'Agree', and conversely if you do not agree. If you are not aware of an issue at all, you can mark the answer 'Ignore this statement'. Try to position yourself for as many statements as possible; there is no right or wrong answer!"

at Wave 2. However, only 216 of them participated in Wave 1, and 186 of them participated in Wave 3. 157 pupils from this group participated in all three waves.

Finally, we also include a control group. Pupils in the control group were invited to fill out a survey on their leisure time activities.[9] The control group was treated in an identical manner to the experimental groups during the pre- and post-test. This intervention, irrelevant to politics, allows assessing the extent to which the regular curriculum has an impact on pupils' sense of political efficacy and trust. This control also serves as the standard of comparison to measure the impact of extraneous confounding factors on outcomes (Creswell & Creswell, 2018). Current affairs, among which is a global health crisis, can be regarded as variables that might interfere with or obscure the relationship between our independent and dependent variables. In any event, the circumstances are held constant across all experimental conditions. A total of five schools, 16 classrooms, and 230 pupils compose the control group at Wave 2. However, only 212 of them participated in Wave 1, and 178 of them participated in Wave 3. A total of 153 pupils from this group participated in all three waves.

The last wave of the study took place between March 9 and April 3. The measurements were repeated in Wave 3 in order to examine the medium-run effects of the interventions. In addition, pupils were surveyed on their classroom activities (classroom climate, discussion, course material, teaching style, and other activities – see questionnaires in the appendix). A total of 692 respondents took part in Wave 2, compared to 615 who participated in Wave 1 and only 487 in Wave 3. All in all, only 401 respondents completed all three waves of questionnaires: 92 pupils for the "advice effect" group, 157 pupils for the "statement effect" group, and 153 pupils for the control group.

For the interventions to be empirically feasible, teachers were given standardized instructions for the submission of questionnaires and interventions. For the rest of their class hours with the participating pupils, they were given discretion to deliver the curriculum following the intervention in order to adhere to real classroom conditions. To address this within-group variation, pupils were surveyed on the classroom activities at the end of the study, and a teachers' survey with open and closed questions was distributed online as soon as all their pupils had completed their last questionnaire. Participating teachers completed their surveys between April 14 and May 12, 2020. The teachers' survey is provided in the appendix.

[9] The following instructions were given in the questionnaire: "You are now going to perform a short computer task. It is a survey about your hobbies and free time activities. There is no right or wrong answer!"

We used deception so as not to arouse pupils' suspicions about the exact focus of my research, nor the existence of any other experimental conditions, but also to ensure that they behave as naturally as possible. This experiment was presented as a study on how technologies affect the daily life of young people. Some pupils may be uneasy by simply reading or hearing terms related to politics and elections. Thus, no pupil feels discriminated against or illegitimate in answering these questionnaires, and this limits self-censorship in pupils' responses. Deception guarantees the autonomy of the students in dealing with a topic that may seem elusive or complicated to them. However, during debriefing sessions, some participants indicated that they saw through the cover story, as they had identified "politics" as a major topic in the questionnaires they completed. The participants were informed of the study's objective right after the last phase of the experiment (follow-up survey). In practice, we organized a debriefing in the classroom for those who answered their last survey in the classroom. Others received a report via their teacher on the first analyses based on their classroom's participation.

3.3. Measurements

Data was collected in three waves with repeated measures. Table 5 illustrates the measurement instruments matrix to document the time points at which each measurement was taken (pre-intervention, post-intervention, follow-up, and/or teacher survey). Questionnaires and the exact wording for each question and item are provided in Appendix B. As can be seen in Table 5, participants were asked about their age, gender, and province of residence at every step in order to identify them from wave to wave. We also consider a range of covariates (such as teacher's effect, demographic characteristics, school track, academic abilities, level of political knowledge, civic engagement, media exposure, etc.). As manipulation checks, we considered the duration of the interventions, and pupils were asked whether they had ever heard of and used the VAA before.

Table 5. Measurement Instrument Matrix

Instrument	Wave 1	Wave 2	Wave 3	Teacher survey
Date of birth / Age	x	x	x	x
Gender	x	x	x	x
Province / country of residence	x	x	x	
Educational track	x			
Specialization/option	x			
Willingness to pursue higher education	x		x	
Head teacher	x	x	x	
IPE & EPE (10 items)	x	x	x	
Political information	x		x	
Left-right placement	x		x	
Party identification	x		x	
Political trust (4 items)	x		x	
Interests (including pol. Interest)	x		x	
Fin. and material conditions at home	x			
Parents' education level	x			
Associative activities	x			
Political discussion	x			
Media use	x			
Intervention (computer task)		x		
Duration of the task completion		x		
Surprised by the VAA result		x (Advice group)		
VAA results		x (Advice group)		
Heard of and use the VAA		x (Advice group)	x	
Evaluation of the task		x		
Voted in 2019			x	
Classroom climate (4 items)			x	x
Classroom discussion (7 items)			x	x
Teaching style & classroom activities (6 items)			x	x
Course material			x	x
School SES				x
Teacher's political participation				x
Teacher's years of experience				x
Class size				x
Class' academic level				x

Note: Author's own elaboration.

3.3.1. Dependent Variables

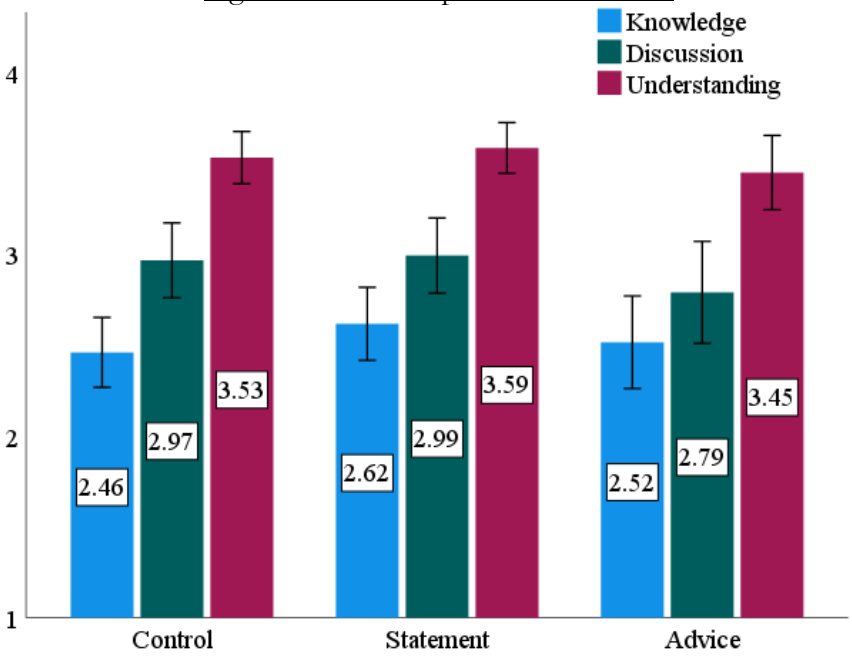
This dissertation considers three understudied variables as dependent variables of VAA use, i.e., IPE, EPE, and political trust. In this sense, the current study fills a gap in the existing research. In the previous chapter, we extensively discuss the conceptualization, drivers, and implications of the three dependent variables. In the present section, we discuss their operationalization.

Primary data was collected through online surveys in three waves. Both internal and external political efficacy was measured at all three time points. Political trust was measured in the pre-intervention and follow-up surveys (Wave 1 and Wave 3). In the early stages of this research project, the main goal was to assess the VAA effect on political efficacy only. Nonetheless, a range of political attitudes variables was also measured in pre-test and follow-up surveys, among which being political trust. For theoretical reasons, and to better capture the processes that underlie long-term political engagement in participatory democracy (see Chapter Two, Section 2.2 for a discussion), political trust was also included as a dependent variable in the final analyses, as available data allows us to.

In each questionnaire, pupils had to position themselves on political efficacy statements. IPE and EPE items were merged into the same block. Each item is scored on a Likert-type scale that ranges from (1) = Strongly disagree to (5) = Strongly agree. The IPE measure contains items from the IEA Civic Education Study (IEA CES) of 14-year-olds, data collection 1999–2000, such as "I know more about politics than most people my age", "When political issues or problems are being discussed, I usually have something to say", and "I am able to understand most political issues easily". These items cover the three aspects of internal efficacy: knowledge, discussion, and understanding of political issues.

Figure 7 below illustrates the baseline score for each IPE component among the three intervention groups. All groups show a similar baseline level on the three IPE components. On average, participants tend to feel less knowledgeable about politics than people of their age (M = 2.46 to 2.62), than they feel capable of discussing political issues (M = 2.79 to 2.99). In addition, on average, they are confident in their ability to understand most political issues easily (M = 3.45 to 3.59). As we examine the internal consistency of the three items, the reliability coefficient indicates that the index is reliable (Cronbach's alpha = 0.737). We can, therefore, construct a scale with the three items. Participants' average score in baseline IPE is found right in the middle of the 1–5 scale (M = 3, SD = .95, see Table 3 in Section 3.2.1, above).

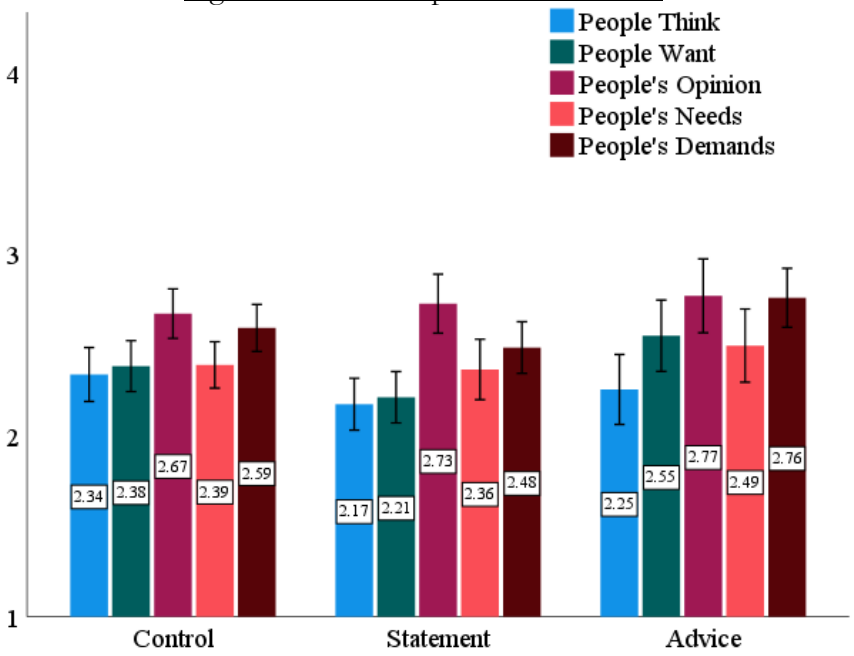
Figure 7. IPE Components in Wave 1



Notes: Colored bars represent mean scores. Error bars illustrate the standard error for each mean score. *N* Control = 152, *N* Statement = 156, *N* Advice = 92.

EPE is captured by five statements: "The government cares a lot about what all of us think", "The government is doing its best to find out what people want", "The powerful leaders in government care very little about the opinions of people", "The politicians quickly forget the needs of the voters who elected them", and "When people get together to demand change, the leaders in government listen". The scale for items 2 and 3 was reversed in our analyses to reflect a positive sense of EPE. Figure 8, below, indicates that all three groups show comparable baseline scores on each EPE component. All mean scores, ranging from 2.17 to 2.77 on the 1–5 scale, are relatively low. All five items – investigating what citizens think and want, and whether they think leaders are listening (Amnå et al., 2004) – are correlated with each other. We can, therefore, build a scale with the five items (Cronbach's alpha = 0.715) ranging from 1 (lowest score of EPE) to 5 (highest score of EPE). Quite interestingly, unlike the IPE scale, none of the respondents show a maximum score of 5 on the EPE scale. It is generally observed in this study that pupils score lower on this scale. A mean EPE score of 2.47 was reported at pre-intervention.

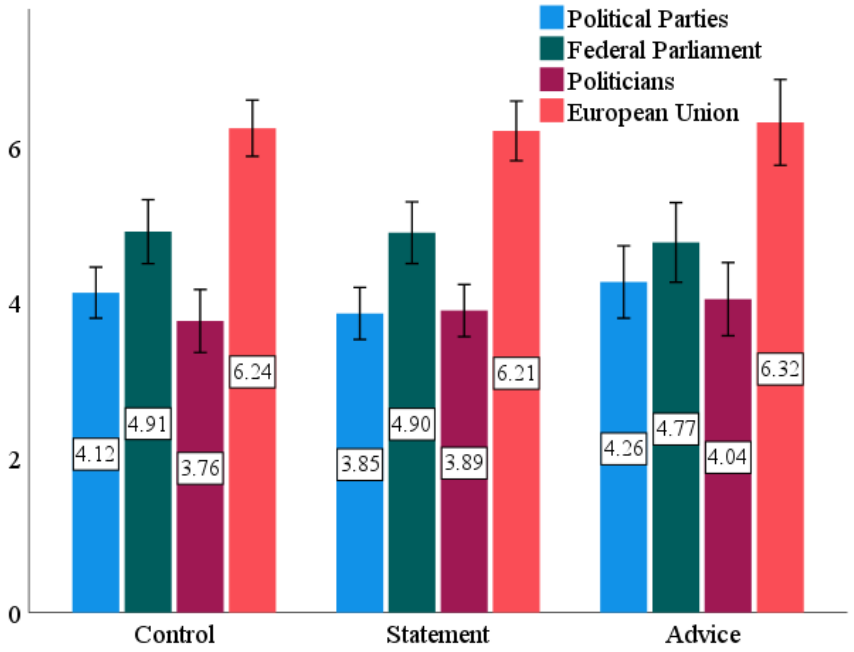
Figure 8. EPE Components in Wave 1



Notes: The colored bars represent mean scores. The error bars illustrate the standard error for each mean score. *N* Control = 152, *N* Statement = 156, *N* Advice = 92.

And last, political institutions play an important role in shaping a democratic society, and it is assumed that trust in these institutions is strongly related to a more comprehensive evaluation of the political system (Hooghe et al., 2015; Marien, 2017). We can properly use the scale that is used for adults to capture trust in political institutions among pre-voters since previous research has found that political trust is formed during adolescence (Claes et al., 2012). Political trust – or trust in political institutions – is captured by four items. Pupils were asked the extent to which they trusted various institutions: "Can you indicate, on a scale of 0 to 10, how much you trust each of the following institutions? Political parties; the federal parliament; politicians; and the European Union (0–10 scale: 0 = Absolutely no confidence; 10 = Complete confidence)". We use the same items as in the EOS RepResent consortium's 2019 survey which allows us to make a comparison with the Walloon adult population's attitudes. The three groups differ very little from each other concerning their level of trust in the various institutions at Wave 1 (see Figure 9 below). All three groups show a similar trend on all scales. As trust in political parties, federal parliament, and politicians score means ranges from 3.85 to 4.91, trust in the EU shows an outstanding mean score of 6.21.

Figure 9. Political Trust Components in Wave 1



Notes: Colored bars represent mean scores. Error bars illustrate the standard error for each mean score. *N* Control = 76, *N* Statement = 111, *N* Advice = 63.

A four-item index would reliably capture political trust. However, trust in the EU is excluded from the dependent variable political trust index for two main reasons. On the one hand, pupils' level on that scale differs from their position on trust in the three other institutions. Trust in the EU is indeed correlated with the other components of political trust. Yet, the trend over time in trust in the EU cannot be associated with that of the other components of the political trust index. Trust in the EU differs from the other components as we see that, on average, respondents show initial levels of trust in the EU that are significantly different from the initial levels for the other components. This observation holds for all three groups (M = 6.21 to 6.32) On the other hand, as the VAA intervention focuses on the federal elections, we expect to observe an effect of the intervention on trust in political parties, the federal parliament, and politicians. Since the intervention does not directly address EU-level policy issues, we expect a more diffuse intervention effect on this component of trust. Hence, it is not theoretically and empirically relevant to include trust in the EU in the political trust index used in this study. The construct of political trust – or trust in political institutions – is thus captured by three items: trust in the political parties, in the federal parliament, and in politicians. The estimates for the reliability of the political trust index for the dataset are satisfying (Cronbach's alpha = 0.796).

3.3.2. Statement Effect

In Wave 2, 15 classes were submitted to an opinion survey on policy issues. These classes form the "statement effect" group. They were asked to position themselves individually on the same 35 policy issues in the *Test électoral fédéral.* However, the pupils in this group do not receive voting advice as an outcome. Pupils in this group do not benefit from the interactive effect of the VAA. In this way, and by comparing the outcomes of the "statement effect" with the control group, we can verify whether any change in attitude is due to the "VAA statement effect", i.e., the mere information stimulus contained in the political statements of the VAA, or to extraneous variables. None of the VAA effects studies have disentangled the effect of the VAA statement from VAA advice effect to this day. Hence, we make comparisons between the statement and control groups in the analyses displayed in Chapter Four as regards statement effect.

3.3.3. Advice Effect

The comparison of the two intervention groups allows us to distinguish the VAA advice effect from the VAA statement effect. Pre-voters in the "advice effect" group were invited to give their opinion (agree/disagree) on the 35 statements of the *Test électoral fédéral* and obtained "voting advice" as a result. The "advice effect" group was composed of 20 classes, whose pupils had access to the *Test electoral éducatif* website and all the functionalities added to the statements and advice. Among these features, as they answer policy statements, there are pop-up windows displaying the definition of complex words, and parties' arguments for each statement, initially anonymized. Once VAA users have access to their personalized VAA advice webpage, they have the possibility of selecting the parties or statements they wish to display arguments for. Nonetheless, we do not have access to the navigational or log file data, so we cannot determine the extent to which individuals have used these features. Yet, we address the time spent on the VAA website in Section 3.3.6, "Manipulation Check" below.

In the empirical analysis on the advice effect discussed in Chapter Five, we compare the "advice effect" group with both the "statement effect" and control group. By comparing "statement effect" and "advice effect" groups, we can verify whether any change in attitude is due to the "VAA statement effect" or to the "VAA advice effect", comprising the positioning on 35 statements, use of the VAA features, and receiving voting advice. In that sense, the study's design introduces several elements that may contribute to the observed between-group differences and in turn, affect internal validity in the study. Only participants in "advice effect" condition interacted with the VAA interface, which could introduce effects due to the specific format and presentation

of the statements. These participants also had the option to receive additional explanations, which may impact their decision-making process. In addition, to ensure that any observed effects are not simply due to random variation or other extraneous factors, we assess the impact of the VAA intervention regarding the control group.

3.3.4. Match Effect

Regarding the VAA match effect, advice congruence, or the measure of (dis)confirming or activating advice from the VAA, we look at individuals' initial party preference (measured at Wave 1) compared to the (declared) advice given by the VAA. Few VAA studies have tackled the VAA match effect to this day (see Chapter Two, "Literature Review"). Most of the VAA match effect studies consider the measurement of VAA advice congruence at the level of the preferred party (Alvarez et al., 2014; Enyedi, 2016; Klein Kranenburg, 2015; Kleinnijenhuis et al., 2017; Mahéo, 2016; Stadelmann-Steffen et al., 2022; Talukder et al., 2021). Based on the assumption that the VAA's best matching party is the one that the user comes closest to and thus might consider voting for, the authors conceptualize VAA matchmaking as the congruence between the user's preferred party (before VAA exposure) and their actual VAA result's best matching party. It must be noted that we find different definitions for the term "consistent advice" in the VAA literature. Kleinnijenhuis et al. (2017) use the term "inconsistent advice" to describe the situation in which an individual uses more than one VAA and obtains conflicting/diverging advice from one another as a result.

With the data at our disposal, we can determine whether pre-voters received incongruent, congruent, or activating advice. We regard VAA advice as being congruent when the first recommended party (Wave 2) corresponds to a highly ranked party according to a user's initial preferences (Wave 1). VAA advice is coded as incongruent advice when the party on top of the voting advice list (Wave 2) does not correspond to a highly ranked party according to a user's initial preferences (Wave 1). In addition, we consider activating advice when a user did not report any initial preference about the first recommended party.

We measure participants' party preference in Wave 1 and Wave 3, namely about one month before and after VAA exposure. Participants were asked to rate how close they felt to the main seven Belgian French-speaking political parties running in the 2019 federal elections. Party evaluation for each of the seven francophone parties available in the VAA is measured on an eleven-point Likert-type scale. Pupils are also given the possibility to tick a "no opinion" box. Since I am targeting a less knowledgeable population, the question of party preference was contextualized

as: "Wallonia has different political parties. How close do you feel to the ideas of these different parties? If you do not know one of the parties or do not have an opinion, tick the box "No opinion". Items are scored on a scale ranging from (0) = very distant to (10) = very close.

VAA research often encounters recall and report errors regarding users reporting their own VAA results (Talukder, 2021). This risk exists especially when the researcher does not have access to the VAA website logs. Strategies can be implemented to limit this report and recall the risk of bias. Regarding the actual content of VAA advice, measured at Wave 2, participants were asked to report their VAA results, ranking parties from the top (1) to the bottom (7) of the list. Respondents had to keep the VAA results page open while completing their Qualtrics questionnaire in another browser tab. Some of them preferred to take notes about their results on a piece of paper to report their VAA results in the Qualtrics questionnaire afterward. As users have access to their VAA result as they fill in the survey, the risk of report errors is very limited.

In keeping with previous research on the VAA match effect, we regard an overlap between a user's party preference and their actual VAA result's best matching party as congruent VAA advice. We draw from the literature on the propensity to vote (PTV) measures to operationalize party preference, and in turn to classify political parties in terms of ranking. A political party that is awarded a high preference score (8–10) is viewed as one's highly ranked party.

Based on primary data for party evaluation and self-reported VAA results, we computed a categorical variable for "advice congruence". The literature acknowledges that users pay most attention to the party at the top of the list as they discover their VAA result. Hence, we consider that a VAA is congruent as the first party advised by the VAA (measured in Wave 2) matches the respondent's initial preference (measured in Wave 1). The categorical variable for "advice congruence" is defined as "congruent advice" for the respondents who initially scored the first party advised 8 or higher on the 0–10 preference scale at Wave 1. The "advice congruence" variable is equal to "incongruent advice" when the respondent initially scored the Top 1 party below 8. In that way, participants who ranked all parties below 8 in their initial preference and those who preferred another party are considered as receiving incongruent advice. Those who ticked the "no opinion" box for the Top 1 party as regards their party preference are considered to be receiving "activating advice". Activating advice thus applies to participants who have no opinion regarding the top party advised by the VAA. The categorical variable for advice congruence, therefore, expresses the extent to which the actual VAA advice matches the user's prior party beliefs by (dis)confirming their party preferences, or activates new cognitions on political parties (see Chapter Two, Section 2.4.2 on the conceptualization of VAA effects).

Our analyses consider the "advice congruence" variable as representing the match of the Top 1 party in one's VAA advice with a party ranked 8–10 in one's initial party preference. This way of measuring advice congruence is therefore the one that prevails according to previous research on PTV and the VAA match effect. Moreover, we can add nuances to this measurement to ensure the robustness of our findings on the VAA match effects. The first two variations for measuring "advice congruence" are added as we adjust the gauge in terms of breakpoints for high party preference. In addition to considering a high preference score as a score of 8 or higher on the 0–10 preference scale, we also consider it as 6–10 and 7–10 scores in robustness tests. We therefore regard congruent advice as a VAA outcome for which the best matching party corresponds to a political party for which the pre-voter has assigned a high preference score, i.e., 6–10, 7–10, and 8–10 on the 0–10 party preference scale. We do not consider the 9–10 breakpoint because too few respondents would obtain congruent advice in this case. The 8–10 measure is therefore the most conservative measure of advice congruence that we can use while ensuring sufficient comparability between our users' groups.

Furthermore, Mahéo (2016) also considers the second party that is recommended to users to determine whether users received congruent advice. Nevertheless, the gap between the first-, second-, and third-best matching parties is sometimes minimal. Due to marginal differences between the top three parties, users might also pay attention to the second and third parties when processing their VAA results (Talukder, 2021). To test the robustness of our findings on the VAA match effect, VAA advice is also viewed as congruent when at least one of the first three parties advised by the VAA (measured in Wave 2) matches the respondent's initial party preference. On this basis, we can determine whether users received congruent advice (at least one of the first three recommended parties corresponds to a highly ranked party according to a user's initial preferences), incongruent advice (none of the first three recommended parties correspond to a highly ranked party), or activating advice (which applies to those who did not express an initial opinion on any of the top three parties advised by the VAA).

All the above-mentioned measurement variations for advice congruence are therefore categorical variables. As a last robustness check, we also regard advice congruence as a 0–10 continuous variable for the initial preference score of the first party recommended by the VAA. If a respondent checked the "no opinion" box for the first matching party initial preference, an advice congruence score of 0 is assigned.

3.3.5. SES Differences

In addition, our research tackles SES differences, and hence adds to the existing literature by addressing inequalities in VAA effects. We use mother's educational attainment as a proxy for pre-voters' SES. It is indeed acknowledged that parental education, family's socio-economic, and political environment influence children's political attitudes and behaviors (Verba et al., 1995). Parents with higher levels of education are likely to be more informed, interested, and engaged in politics. In turn, they tend to discuss politics at home, relate their personal experiences of political participation to their children, and hence provide them with the impetus to develop political skills. We thus consider a dummy variable for whether respondents' mothers have pursued higher education. Participants were asked, "What is the highest level of education your mother/female guardian? No diploma / Primary diploma; Secondary school diploma (general, technical, vocational, artistic or professional); Higher education degree (high school or university); Other". Respondents have a rather high socio-economic status, as 79% of respondents reported that their mother has a higher education degree (see Table 3 in Section 3.2.1 above).[10]

Table 6 below shows differences between low- and high-SES participants on baseline DV levels, socio-demographic, and political characteristics. First, it has to be noted that high SES pupils are overrepresented in our sample. Only 83 low-SES participants reported baseline political efficacy, in contrast to 311 high-SES participants. There is no evidence of imbalances in IPE between low- and high-SES pre-voters. Yet, we find significant differences in EPE and political trust at each of the three time points. Table 6 documents that low-SES pre-voters show slightly lower baseline EPE (M = 2.35, SD = .67) than high SES pre-voters (M = 2.50, SD = .59), statistically significant at the 10% level ($t(392)$ = -1.947). Regarding baseline political trust, we do not find any statistically yet substantially significant difference based on SES. Low-SES participants show slightly lower baseline political trust (M = 3.88, SD = 1.71) than high-SES participants (M = 4.31, SD = 1.75, $t(268)$ = -1.575). In addition, Table 6 below reveals that participants whose mothers achieved higher education also report better financial and material conditions (M = 4.68, SD = .85) compared to low-SES pre-voters (M = 3.81, SD = 1.04). As 86% of high-SES pre-voters are enrolled in general education, only 53% of low-SES participants are. Pupils enrolled in the fifth year of secondary school are slightly overrepresented among the low-SES participants. We can also note that low-SES pre-voters report less frequent political discussion and lower political interest compared to

[10] It must be noted that father's educational attainment was not used as a proxy for SES in addition to mother's educational attainment to aim for parsimony, and avoid redundancy and collinearity. There is a positive correlation between mother's educational attainment (M = .79, SD = .41) and father's educational attainment (M = .67, SD = .47 ; $r(392)$ = .419, p <.001).

high-SES participants, although these findings do not reach statistical significance at the 10% level. Lastly, Table 6 confirms that high-SES pupils attend schools with a slightly more advantaged background than low-SES participants. All in all, low-SES pre-voters unsurprisingly report lower family standing, education, and political sophistication than high-SES pre-voters. Therefore, as we examine our research question on differentiated VAA effects based on SES, we must bear in mind these baseline differences between low- and high-SES pre-voters.

Table 6. *T*-tests for Sample Characteristics and SES

	Low SES			**High SES**					
Variable	*M*	*SD*	*N*	*M*	*SD*	*N*	*df*	*t*	*p*
Baseline IPE	2.90	1.03	83	3.02	.92	311	392[1]	-1.057	.291
Baseline EPE	2.35	.67	83	2.50	.59	311	392[1]	-1.947+	.052
Baseline Political Trust	3.88	1.71	52	4.31	1.75	218	268[1]	-1.575	.116
Gender	.61	.49	83	.55	.50	311	131.007	1.117	.266
Fin. & Mat. Conditions	3.81	1.04	83	4.68	.85	311	112.557	-7.002***	.000
Educational track	.58	.50	83	.86	.35	311	104.992	-4.769***	.000
School year	5.45	.50	83	5.55	.50	311	392[1]	-1.689+	.092
Political discussion	8.55	3.09	83	9.15	3.21	309	390[1]	-1.504	.133
Political interest	3.57	2.96	83	4.10	2.69	311	392[1]	-1.572	.117
School SES	3.75	.75	83	3.93	.83	311	392[1]	-1.790+	.074

Note: [1]Assuming equal variance. Statistical significance: *** p-value ≤ 0.001 • ** p-value ≤ 0.01 • * p-value ≤ 0.05. • + p-value ≤ 0.10.

3.3.6. Manipulation Checks

Manipulation checks aim to evaluate whether the study successfully manipulated the independent variables of interest (Creswell & Creswell, 2018). A manipulation check can be used as an indicator of the internal validity of an experiment. We seek evidence that participants performed the tasks they were asked to in a genuine way.

As a first manipulation check, we use the duration of the intervention. The researcher was not personally present during the intervention in the classroom in Wave 2. Therefore, we cannot rely on qualitative in-person observations of participants' involvement in the intervention. To make up for this disadvantage, we used a timer from Qualtrics, which was hidden from the participants. This allows us to record how long participants spend on the VAA website or by browsing VAA statements implemented in the Qualtrics survey for the "advice effect" group and "statement effect" group, respectively. The timing function records four metrics: first click, last click, page submit, and click count. By doing so, we check whether they simply click on answers or think about their answers, basedon how long they spend on the page. The length of the intervention serves as a quantitative proxy for genuine use of the VAA.

Table 7 below displays the average, minimum, and maximum duration of the intervention for the "advice effect" group and "statement effect" group. They all report a realistic duration for VAA use or statements exposure. Among participants who visited the *Test électoral* on federal elections, we see a minimum duration of the intervention of 2'44" and a maximum of 32'11". The average length of the VAA intervention is 7'27". As for those who were exposed to VAA statements only, they report a minimum duration of 1'44"; the maximum duration goes up to 12'20". On average, they spend 3'01" browsing and answering VAA statements. In both groups, we find that some participants rapidly skim from page to page, quickly considering VAA statements. Some others carefully pore over VAA statements and advice.

Table 7. Intervention Duration

Intervention group	*N*	Mean	Median	*SD*	Min	Max
Advice	92	7'27"	7'33"	5'14"	2'44"	32'11"
Statement	156	3'01"	2'49"	2'22"	1'44"	12'20"
Total	248	3'53"	4'34"	3'35"	1'44"	32'11"

Note: The sample is composed of respondents who participated in all three waves.

This is also evidence that interventions are kept relatively short, recognizing that there is rarely time for more extensive activities in regular school lessons (Oberle & Leunig, 2016). In terms of length, a VAA intervention thus meets the requirements of regular school lessons. It must be noted, however, that the timing for the activity setup and debriefing were not measured.

Second, as the *Test électoral éducatif* was freely available online, we asked respondents whether they have ever heard of or used the VAA. Pupils in the "advice effect" group were asked the following questions in Wave 2: "Have you heard of the *Test électoral* before today? (Yes, No); Have you ever used the *Test électoral*? (Yes, No, I don't know). The two other groups were asked this question at the end of the Wave 3 survey so as not to inform them of the existence of the VAA before the end of the study. The risk would have been that they would visit the website and use the VAA, which in turn contaminates the VAA intervention to other intervention groups. The questions were framed as such: "Have you ever heard of the *Test électoral* of *La Libre* or *RTBF,* which was online before the elections of last May? (illustrations below) (Yes, No) Have you used this *Test électoral*? (Yes, No, I don't know). None of the participants gave a positive answer to any of these questions; this being the case, we can state with certainty that contamination of the VAA intervention was prevented. Our sample results also suggest that the *Test électoral* did not make its way to pre-voters outside schools, even though it is free to use online.

3.4. Data Analysis Procedures

The present section offers a general overview of the methods used for data analysis. We provide a detailed explanation of the statistical methods used to analyze the data in the empirical chapters, i.e., Chapters Four to Six. All statistical analyses were performed using the software StataSE 17. First, descriptive data was generated for all variables. For each dependent, independent, and control variable, we reported average mean scores and standard deviation as a measure of dispersion in the present chapter. The percentage of missing data, and the minimum and maximum values of the sample, were also reported. Descriptive statistics as regards the experimental data for investigating the statement and advice effect are displayed in Table 3 from Section 3.2.1 above. As regards the observational data for investigating the match effect, descriptive statistics are displayed in Table 8 from Section 3.5 below.

We use a multiple-step analysis approach in order to offer a comprehensive examination of our research questions and robust interpretation of the results. This approach helps us to examine the data thoroughly at different levels. As a first step, descriptive within group analysis provides a detailed understanding of the DVs within each group separately, offering insights into group characteristics and trends. As a second-step, bivariate between group analysis allows for comparative analysis of the DVs between different groups, identifying significant differences or associations. As a third-step, multivariate between-group analysis allows for a comprehensive assessment of multiple variables simultaneously, control for confounding variables, and further extends the understanding of the research phenomenon. Hence, as we systematically and thoroughly examine the data at different levels, we provide a nuanced interpretation of the findings in considering various perspectives.

In Chapters Four and Five, we use experimental data to investigate our research questions and hypotheses about the statement and advice effects. We employ a four-step analysis for each DV: Descriptive within-group analysis (error bar graphs), bivariate between-group analysis (*t*-tests and one-way ANOVA), multivariate between-group analysis (multilevel regression), and bivariate analysis of DV changes differences across SES groups (*t*-tests). Regarding the match effect, we consider observational data among the subset of VAA users. In Chapter Six, we proceed with a three-step analysis for each DV: Descriptive within-group analysis (error bar graphs), bivariate within-group analysis (one-way ANOVA and *t*-tests), and bivariate analysis of DV changes differences across SES groups (*t*-tests).

In our inferential analyses, we consider a statistical significance threshold of 0.10 for determining whether the results of the study are statistically significant. We did not set restrictive significance thresholds, so as not to indiscriminately discard predictors with p-values between 0.10 and 0.05. We determined this threshold in regard to the small sample size and statistical power of the study. In addition to statistical significance, we also consider the substantial relevance of our research findings. As the sample size is small and the study is underpowered, some results may be substantially significant yet still fail to reach statistical significance. Hence, to determine substantial relevance, we will refer to the magnitude of the observed effect and whether it is meaningful in the context of the study. We consider factors such as the practical importance of the outcome and the size of the effect.

We proceeded to multiple robustness checks to strengthen the validity of our findings. To assess the immediate impact of the VAA (measured in wave 2), we also considered the sample of all participants who took part in the two first waves of the study, regardless of their participation in the last wave. This approach allows us to run the analyses on a larger sample, enhancing the statistical power of our analyses. As an additional robustness check, we examine the match effect using the alternative measurements of advice congruence, described in Section 3.3.4. Results from the robustness tests are reported and discussed in the appendices.

Moreover, before we turn to the empirical investigation of our research questions and hypotheses, we must assess the validity of the *Test électoral éducatif* for pre-voters' use. We explore the latter consideration in the following section.

3.5. Validity of the *Test électoral éducatif*

VAA research acknowledges the match effects on turnout and party preferences (see Chapter Two, Section 2.4.2 for a review). However, research has overlooked the key drivers of (in)congruent advice exposure. One could posit that some VAA users might be more likely to receive (in)congruent advice resulting from their VAA use. Research shows that a minority of users receive congruent advice (Alvarez et al., 2014; Enyedi, 2016; Gallina, 2018; Kleinnijenhuis et al., 2017; Mahéo, 2016; Talukder et al., 2021; Wall et al., 2014). It must be noted that these studies focus on the voting population during election campaigns. Although VAA designers express the wish to first and foremost inform and educate young and less-informed citizens, research has paid too little attention to the impact of VAAs on young people who do not yet have the right to vote. Moreover, scholars overlooked the validity of the use of these tools by a pre-voting population.

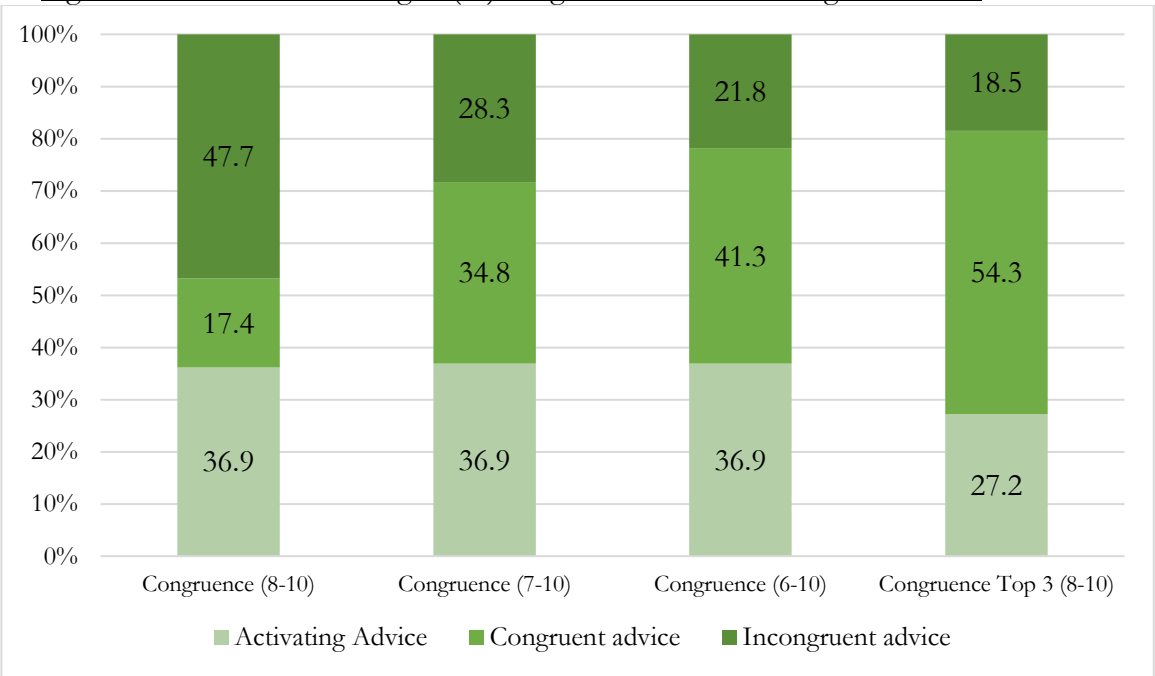
Hence, we assess the validity of the *Test électoral éducatif* for pre-voters in order to ensure a reliable assessment of VAA effects in the next analysis chapters.

The issue of VAAs' validity is crucial since the political attitudes and beliefs of young users are likely to be developed relying on these tools. Thus, we address the question of the quality of the political mirror that is produced by VAAs for such an audience. Moreover, it is acknowledged that pre-voters demonstrate low levels of political understanding (Moeller et al., 2018). Since VAAs are foremost designed to provide voters with guidance during election campaigns, one may wonder whether VAAs are suitable tools for pre-voters. As a first step, we must assess whether the *Test électoral éducatif* renders valid advice for pre-voters. To do so, we start from the premise that those who have a good understanding of political matters show a greater ability to understand the content of a VAA questionnaire, and to position themselves toward political statements and parties (Fossen & Anderson, 2014). In this respect, they have the literacy skills required to use a VAA accurately. From this arises the validity of one's VAA personalized matching result. In concrete terms, the validity of a VAA and its outcome occurs as politically interested users receive advice that is congruent with their political convictions.

Thus, we assume that pre-voters that are politically interested and knowledgeable are better able to use the VAA because they are used to processing correct political information. The *Test électoral éducatif* is expected to render correct advice and to be a valid VAA, assuming that pupils are sufficiently competent to quickly express cogent policy preferences in response to appropriately formulated issue statements (Fossen & Anderson, 2014). We expect that those who are more interested in the realm of politics are more likely to get congruent advice, as they are more literate in using a VAA. We use pre-voters' baseline political interest as an indicator of political understanding and sophistication. In this way, a VAA can be regarded as measuring users' preferences in a valid and reliable way in cases where the most sophisticated users receive congruent advice. VAA designers and researchers sometimes consider this as an indirect quality test of a VAA (Germann et al., 2015).

Figure 10 below shows the share of VAA users who received incongruent, congruent, or activating advice. In this subsample of VAA users, only those who both reported their VAA results in the Wave 2 survey and participated in all three survey waves are retained.

Figure 10. Share of Activating & (In)Congruent Advices Among VAA users



Note: Total *N* = 92.

It should be recalled that we regard congruent advice as a VAA outcome for which the best-matching party corresponds to a political party for which the pre-voter has assigned a high preference score, i.e., 8–10 on the 0–10 party preference scale. Among the 92 VAA users, 47.7% of them received incongruent advice. A large minority of them received congruent advice (17.4%). 36.9% of VAA users received activating advice. We find similar results to Alvarez et al.'s (2014) study using a dataset from users of the 2009 pan-European VAA *EU Profiler*: about one out of five users receive VAA advice congruent to their initial party preferences.

Our findings are consistent with previous research: as with an adult voter population, most pre-voters are exposed to an incongruent "political profile". If we regard congruent advice as a VAA outcome for which the best matching party corresponds to a political party for which the pre-voter has assigned a preference score equal to 7 or above, the share of users who receive congruent advice goes up to 34.8%. If we consider 6 as a breakpoint for a high preference, this ratio goes up to 41.3%. In addition, and contrary to previous research, our research considers activating advice. It is found that about 36.9% of pre-voting VAA users receive activating advice. Unsurprisingly, a large part of these young VAA users does not report any prior opinion about their best-matching political party, as rendered by the VAA.

Table 8. Match Effect: Descriptive Statistics

Intervention group	Incongruent	Congruent	Activating	Total						
	Mean	Mean	Mean	Mean	*N*	*SD*	Min	Max	% missing	*F*-test (*p*-value)
Baseline IPE	3.01	3.85	2.41	2.93	92	.96	1	5	0%	<.001
Baseline EPE	2.48	2.60	2.54	2.52	92	.62	1	4.20	0%	.667
Baseline Political Trust	4.45	5.52	3.38	4.27	63	1.90	0	8.33	34.4%	.009
Gender	.55	.47	.71	.59	92	.49	0 (man)	1 (woman)	0%	.169
Man (in percentages)	45	53	29	41	38					
Woman(in percentages)	55	47	71	59	54					
Mother's highest diploma	.57	.69	.59	.60	92	.49	0 (secondary)	1 (higher ed)	0%	.722
Secondary Education (and below)	43	31	41	40	37					
Higher Education (in percentages)	57	69	59	60	55					
Fin. & Mat. Conditions	4.11	4.35	4.31	4.23	92	1.05	1	6	0%	.612
Educational Track	.70	.88	.66	.72	92	.45	0 (technical)	1 (general)	0%	.234
Technical Track (in percentages)	30	12	34	28	26					
General Track (in percentages)	70	88	66	72	66					
School year	5.80	5.71	5.60	5.71	92	.46	5	6	0%	.169
Fifth Year (in percentages)	20	29	40	29	27					
Sixth Year (in percentages)	80	71	60	71	65					
Political Discussion	8.55	9.71	7.34	8.31	92	3.15	4	18	0%	.031
Political Interest	3.66	5.59	2.63	3.63	92	2.92	0	10	0%	.002
School SES	4.05	4.12	3.97	4.03	92	.96	2	5	0%	.869

Note: All measurements were taken at pre-intervention except for School SES information that relies on teacher's survey data.

On another note, pre-voters show varying background characteristics, whether they receive incongruent, congruent, or activating advice. Table 8 above displays the descriptive characteristics for the observational data on the match effect. Table 9 below provides additional information on between-group differences from one-way ANOVA tests. These first analyses reveal that the differences between groups of advice types lie in political attributes, rather than socio-demographic characteristics. In terms of baseline IPE, baseline political trust, political discussion, and political interest, pupils who receive activating advice show lower levels than those exposed to incongruent advice, which also show lower levels than those exposed to congruent advice.

Table 9. Match Effect: Between-Group Comparisons

	Intervention group	Mean Dif.	*p*
Baseline IPE	Activating vs Incongruent	-.60*	.005
	Activating vs Congruent	-1.39*	<.001
	Incongruent vs Congruent	-.80*	.003
Baseline Trust	Activating vs Incongruent	-1.35*	.029
	Activating vs Congruent	-1.92*	.016
	Incongruent vs Congruent	-.58	.626
Political Discussion	Activating vs Incongruent	-1.20	.200
	Activating vs Congruent	-2.36*	.029
	Incongruent vs Congruent	-1.16	.386
Political Interest	Activating vs Incongruent	-1.03	.232
	Activating vs Congruent	-2.96*	.001
	Incongruent vs Congruent	-1.93*	.043

Note: * The mean difference is significant at the 0.05 level.

To assess the validity of the VAA for pre-voters' use, we further look at between-group differences in terms of political interest. We expect that those who are more interested in the realm of politics are more likely to get congruent advice as they are more literate in using a VAA. ANOVA tests displayed in Table 9 above allow us to compare initial levels of political interest among VAA users who received incongruent, congruent, and activating advice. The 16 participants who received congruent advice (M = 5.59, SD = 3.26) demonstrate significantly higher political interest at Wave 1 compared to the 42 participants who were exposed to incongruent advice (M = 3.66, SD = 2.84, p = .043) and to the 34 participants who were exposed to activating advice (M = 2.63, SD = 2.39, p = .001, F (2,93) = 6.550; p = .002). This is further confirmed as we conduct robustness tests by performing ANOVA tests considering different ways to measure advice congruence (see Tables A.1 and A.2 in the appendix).

All in all, the more political interest a pre-voter shows, the more likely they are to get congruent advice. The *Test électoral éducatif* is a suitable tool to be implemented in schools with pre-voters. Given the evidence that the most politically interested participants tend to receive congruent

advice, the following empirical chapters (Chapters Four to Six) investigate and produce valid results on the effects of the VAA. However, the *Test électoral éducatif* does not seem to achieve its full potential among those who are uninterested. As some pupils are sufficiently competent to quickly position themselves in response to VAA statements, others are not. One may therefore wonder how to improve the VAA if it does not work with the less politically sophisticated. We provide recommendations for VAA design in the concluding chapter of the thesis.

3.6. Validity & Limitations of the Study

Before we turn to the empirical investigation of our research questions in the following chapters, we must shed light on the research standards we followed in order to produce valid results. It must be noted that we develop the ethical considerations of the present research in the appendix. In the present section, we address the validity and limitations of the study to close this methodology chapter.

Validity in quantitative research "refers to whether one can draw meaningful and useful inferences from scores on particular instruments" (Creswell & Creswell, 2018, p. 251). In the present section, we discuss the threats to internal and external validity, and we provide information on actions that were taken in response. On the one hand, internal validity threats are "experimental procedures, treatments, or experiences of the participants that threaten the researcher's ability to draw correct inferences from the data about the population in an experiment". On the other hand, external validity threats arise when experimenters draw incorrect inferences from the sample data to other persons, other settings, and past or future situations (Creswell & Creswell, 2018, pp. 170–71). The validity of the study hence depends on the way data is collected, measured, analyzed, and interpreted. We follow Creswell & Creswell's (2018) guidelines to identify and address validity issues.

As regards internal validity threats, first, we tackle the history threat. Because time passes alongside the data collection waves, we cannot prevent real-life events that influence the outcome beyond the experimental intervention. The control group serves as the standard to which comparisons can be made to extricate the impact of extraneous confounding factors on outcomes (Creswell & Creswell, 2018). Current affairs, among which being a health crisis, can be regarded as variables that might interfere with or obscure the relationship between our independent and dependent variables. Second, we raise the maturation threat. Participants in an experiment may

mature or develop during an experiment, thus influencing the results. In response, we select participants who mature at the same rate during the experiment, namely, pupils of the same age.

Third, Creswell & Creswell's typology of internal validity threats identifies selection. Participants have certain characteristics that predispose them to certain outcomes. Selection bias can have several implications in research. A sample that is not representative of the population can skew the study's results, rendering them invalid or biased. It might also affect the assessment of causal relationships, as confounding variables may influence the relationship between the IVs and DVs under study. Selection bias can also raise external validity concerns, as the ability to apply findings to the wider population is limited. To prevent selection bias, we randomly select intervention groups to increase the probability of equal distribution of the characteristics among the experimental groups. In addition, we control for imbalances between intervention groups in our analyses.

Fourth, we also encountered study attrition, which refers to participants dropping out during an experiment. The outcomes are thus unknown for these individuals. There are multiple reasons why one might drop out, and we recruit a large sample to account for this eventuality. Yet, the dropout rate may be higher in one group than the other, and intervention groups may show slight variations in several socio-demographic characteristics in pre-intervention. For these reasons, we consider control variables in our analyses. Yet, it must be noted that the small sample size in some subgroups necessitates cautious interpretation of the results, as we may encounter between-group imbalances and low statistical power.

Fifth, experimental research might encounter diffusion of treatment (also called cross-contamination of groups). This situation may occur when participants in the control and experimental groups communicate with each other. This communication might influence how groups score. To keep the groups as separate as possible during the experiment, we used a random cluster assignment of intervention at the teacher/school level.

Sixth, testing bias might occur when participants become familiar with the outcome measure and remember responses during later testing. Hence, we chose to keep a one-month interval between waves of administering the survey. Pilot tests revealed that the one-month timing between each wave is sufficient for pupils not to attribute their behavioral changes to the activity performed in the experiment. As a last internal validity threat, there is the instrumentation issue, which might occur when the measuring instrument changes between waves, thus impacting the score on the outcome. Pilot experiments allowed us to test our questionnaire and amend items if

proven to be inadequate. During the trials phase, we used the same measuring instrument across each waves.

Turning to external validity threats, first, there is the selection of participants. Because of the narrow characteristics of participants in the experiment, the researcher might not be generalizable to individuals who do not share the characteristics of those in the sample. Sampling bias is an issue, as participating teachers self-selected to take part in the study. To recruit the participants, we proceeded by sending out email batches to high school principals in the five Walloon provinces. In turn, the school principals chose whether they wanted to forward my request to their teachers. The teachers were then free to contact me if they wanted their classes to participate. Due to this type of process, education studies often suffer from self-selection biases: teachers who volunteer are likely to be among the more computer literate among their colleagues, and to show a higher-than-average degree of openness to new teaching and learning methods. A limitation of our study thus lies in the sampling bias. Some members of the population are more likely to participate than others, and to therefore be overrepresented (Adams & Lawrence, 2019).

In addition, we chose to ensure greater homogeneity in the sample by including participants from general education, and from technical education with a specialization in humanities. Participants with other specializations or in vocational education are excluded from the sample. As a drawback, sample homogeneity comes at the expense of the generalizability of our findings to all school contexts. In any case, we must keep in mind that we cannot make claims about groups to which the results cannot be generalized. For this very reason, we carefully describe the sample population.

Second, because of the uniqueness of the setting, a researcher might not be able to generalize to other settings. We conducted our research among students from many class backgrounds, and in different school settings, to test whether the same results occur in other classroom settings. We must bear in mind that it is necessary to restrict claims to a particular classroom setting. Further research must be conducted if we want to draw conclusions about the intervention applicable to other settings, such as using a VAA on a mobile device from home. And lastly, we acknowledge historical bias because of the timing of the experiment. The results of an experiment are time-bound, and might not hold to past or future situations.

Yet, we aim to provide a carefully designed study with a representative sample, and controlled variables that can be replicated by other researchers. Valid research must be conducted in order to produce generalizable knowledge. If the experimental setting and procedures are unrestrained to represent real-life circumstances more closely with a multitude of varying factors,

the internal validity of the study may be so compromised, rendering insignificant results or leading to an inability to identify which factor or factors created differences in the DV (Adams & Lawrence, 2019). When designing this study, we took special care to balance the internal and external validity so that we can draw a confident conclusion regarding the influence of IV on changes in DV, as well as the relevancy of the findings to other situations and populations.

To conclude the present chapter on research design and methodology, we must address the researcher's positionality resulting from their stance in relation to the research topic. This positionality would shape the research process from formulating the research question to interpreting the findings. As is often encountered in VAA research and education research, the researcher takes both the role of designing the intervention and of investigating its effect empirically in the field. I contributed to the development of the Belgian VAA *Stemtest, Test électoral*. As a member of the VAA design team, I mainly participated in identifying relevant issues, formulating the statements, and checking francophone parties' answers and argumentation to each VAA statement. As soon as the VAA launched online, I was also in charge of following up with users on social media and via email. As a researcher, however, throughout the formulation of the research problem and the discussion of the results, I acknowledge the limitations of the tool with a critical outlook. Finally, we also provide suggestions and recommendations regarding the design of the tool in the concluding chapter of this study.

Chapter Four: The VAA Statement Effect on Pre-Voters

4.1. Introduction

In the present chapter, we start our empirical investigation of the lead research question of the present research: To what extent does a VAA have an impact on pre-voters' political efficacy and trust? (RQ1). In our investigation aiming to unpack VAA effects on pre-voters' political efficacy and trust, we first address the statement effect. The latter results from simple exposure to VAA statements. In the present analysis chapter, we investigate the relationship of VAA statement exposure, as IVs, with IPE, EPE, and political trust, as DVs. In this sense, our study helps to bridge gaps in the current understanding of VAAs' effects and their impact on political attitudes.

We extensively developed our hypotheses on the statement effect in Section 2.5.1 in Chapter Two. First, we scrutinize the statement effect hypothesis on IPE. For young users with little or no prior political information, the simple fact of acknowledging policy issues introduced by VAA statements has the potential to raise awareness about the content of the issues discussed in the policy arena. VAAs' statements might facilitate an understanding of political issues and provide a framework for thinking about what politics involve (Beaumont, 2011; Levy, 2013). Therefore, we assume that VAA statements cognitively engage users to examine their perception of their ability to understand, discuss, and participate in politics. The first hypothesis we raise is that "VAA statements exposure has a positive impact on pre-voters' internal political efficacy" (Hypothesis 1).

Second, we examine the statement effect hypothesis on EPE. We start from the premise that VAA statements convey information on policy issues that made it to the agenda. Information on policy issues signals that these questions are likely to be addressed by policy-makers (Bevan & Jennings, 2014). Citizens can use such information on issues' attention allocation as a standard for judging the responsiveness of policy-makers (Esaiasson & Wlezien, 2017; Jones & Baumgartner, 2004). As VAA statements aggregate several policy domains, they might lead to the perception that authorities tackle to some extent domains that matter to the citizens (Esaiasson & Wlezien, 2017). Hence, we hypothesize that "VAA statements exposure has a positive impact on pre-voters' external political efficacy" (Hypothesis 2).

Thirdly, we investigate the statement effect hypothesis on political trust. VAA statements might unravel the tasks and responsibilities of political institutions, which in turn might result in a greater appreciation of the complexities of politics and decrease political cynicism (Denver & Hands, 1990). In that sense, VAA statements might create opportunities to raise users' awareness of the political issues at stake, and ultimately catch clear interest that would build up political trust. Trust in the political institutions in democratic systems builds on a better understanding of how democracy works. On that basis, we expect that exposure to VAA statements contributes to developing pre-voters' political trust. We hypothesize that "VAA statements exposure has a positive impact on pre-voters' political trust" (Hypothesis 3).

In addition, we do not only assess the main and immediate statement effect, but we also investigate the medium-run effect, namely one month after VAA statements exposure. We acknowledge that VAA influence can be tainted with the effects of time, individual learning, or classroom discussion (see Section 2.5.4 in Chapter Two). Therefore, we address another research gap and ask: "To what extent does a VAA have a lasting impact on pre-voters' political efficacy and trust?" (RQ2).

Lastly, we investigate the influence of pre-voters' socio-economic status on the statement effect. We use mother's educational attainment as a proxy for pre-voters' socio-economic status. It is indeed acknowledged that parental education, family's socio-economic and political environment influence children's political attitudes and behaviors (Verba et al., 1995). Parents with higher levels of education are likely to be more informed, interested, and engaged in politics. In turn, they tend to discuss politics at home and relate their personal experiences of political participation to their children, and this incentivizes them to develop their own political skills (see Section 2.5.5 in Chapter Two). Considering this, we observe political inequalities based on young people's socio-economic background within our sample (see Section 3.3.5 in Chapter Three) Yet, using a VAA in the classroom has the potential to provide political information to those who do not learn politics at home. We explore the extent to which VAA statements exposure might benefit pre-voters in different ways based on their SES, regarding the development of political attitudes. Therefore, we ask: "To what extent is there a difference in VAA effect based on SES?" (RQ3).

4.2. Analyses and Results

The present section empirically investigates the hypotheses on the VAA statement effect. We assess the statement effect by comparing the outcomes of the "statement exposure" group with the control group. The latter serve as a yardstick to detect the extent to which answering and reflecting upon policy statements have the potential to help build pupils' sense of political efficacy and trust. In this way, we can verify whether any change in attitude is due to the "VAA statement effect", i.e., the mere information stimulus contained in the political statements of the VAA, or to other extraneous variables. None of the VAA effects studies have disentangled the effect of the VAA statement from the VAA advice effect to this day. In Chapter Three, we provide a thorough description of the research methods and design. In it, we also extensively discussed the constructs of the three dependent variables of interest, i.e., internal political efficacy, external political efficacy, and political trust.

To investigate our research questions and hypotheses about the statement effect, we proceed with a four-step analysis for each DV: Descriptive within-group analysis, bivariate between-groups analysis, multivariate between-groups analysis, and bivariate between-group analysis of DV change differences between low- and high-SES pre-voters. We examine the statement effect in both the short and medium run for IPE and EPE. Yet, we only assess medium-run impact regarding political trust (see Chapter Three for a thorough discussion of the research design).

4.2.1. Descriptive Within-Group Analysis

To detect the statement effect on pre-voters' IPE, EPE, and political trust we first examine group differences across time for each component of the dependent variables' constructs. In Chapter Three (Research Methods & Experimental Design), we reviewed the construction of the indexes for each DV. Error bar graphs allow us to visually inspect each intervention groups' mean score on the DVs' components at all time points. These figures also display standard error for each mean score to assess the significance of between-group differences. Within-group mean scores and differences between waves are further detailed in the appendix (Tables A.3 to A.5).

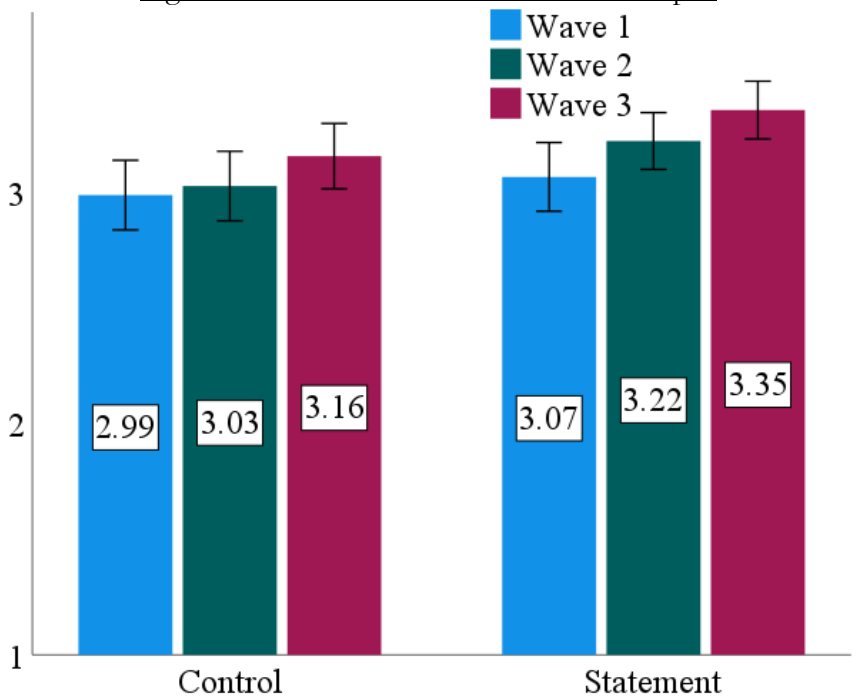
In Chapter Three (Research Methods & Experimental Design), we reviewed the construction of the IPE index. To that end, we first explored the Wave 1 group differences for each of the three IPE components (i.e., "I know more about politics than most people my age"; "When political issues or problems are being discussed, I usually have something to say"; and "I

am able to understand most political issues easily"). The three items cover the three aspects of internal efficacy: knowledge, discussion, and understanding of political issues.

The entries in Figure 11 below show the values on the IPE index for each of the three groups in the three waves. The first set of bars illustrates the growth in IPE of the control group. The latter reports an average baseline IPE score of 2.99. The control group shows the lowest improvement, experiencing a 0.17 difference between Wave 1 and Wave 3. The evolution of the control group indicates that the normal curriculum contributes only marginally to the improvement of the pupils' IPE level over the months. The respective bars for each group overlap except for those of Wave 1 and Wave 3 for the statement group.

The "statement effect" group shows a baseline mean score of 3.07 on the 1–5 IPE scale. This group shows a consistent and positive evolution between waves. Table A.3 in the appendix displays within-group mean IPE scores and differences between waves. This table indicates that the "statement effect" group shows the greatest growth in IPE from Wave 1 to Wave 3, reporting an improvement of 0.28 on the IPE scale. All in all, this is a first indication of significant change in IPE through time.

Figure 11. IPE across Time: Error Bar Graphs



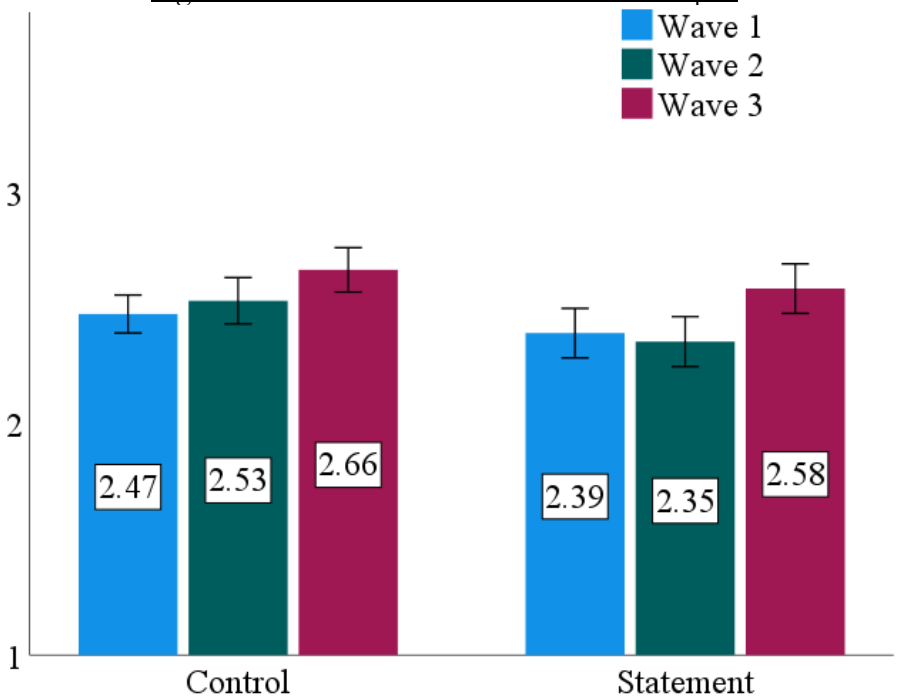
Notes: Colored bars represent mean scores. Error bars illustrate the standard error for each mean score. *N* Control = 152, *N* Statement = 156.

The external political efficacy scale is composed of five items: "The government cares a lot about what all of us think"; "The government is doing its best to find out what people want"; "The powerful leaders in government care very little about the opinions of people"; "The politicians

quickly forget the needs of the voters who elected them"; and "When people get together to demand change, the leaders in government listen". We discussed participants' initial score on each of the five components in Chapter Three (see Section 3.3.1 "Dependent Variables").

Figure 12 below illustrates the two groups' evolution trends on the comprehensive index defined by the five components for EPE. Table A.4 in the appendix displays detailed within-group mean EPE scores and differences between waves. As we look at the first set of bars, the change in the control group indicates that the normal curriculum contributes to a consistent but marginal improvement in the sense of EPE. In contrast, we can see that the statement group experiences a minor deterioration in its EPE level as an immediate effect of exposure to VAA statements. Pupils in the statement effect group then experience an increase in their sense of external efficacy at the end of the study. They show an average initial EPE score of 2.39 that falls to 2.35 in Wave 3 and rises to 2.58 at the end of the study. On average, all groups showed an improved sense of EPE at the end of the study. It must be noted that the error bars overlap greatly, which indicates a marginal change in the outcome. All in all, we find that the "statement effect" and control groups both show a 0.19 score improvement between Wave 1 and Wave 3.

Figure 12. EPE across Time: Error Bar Graphs

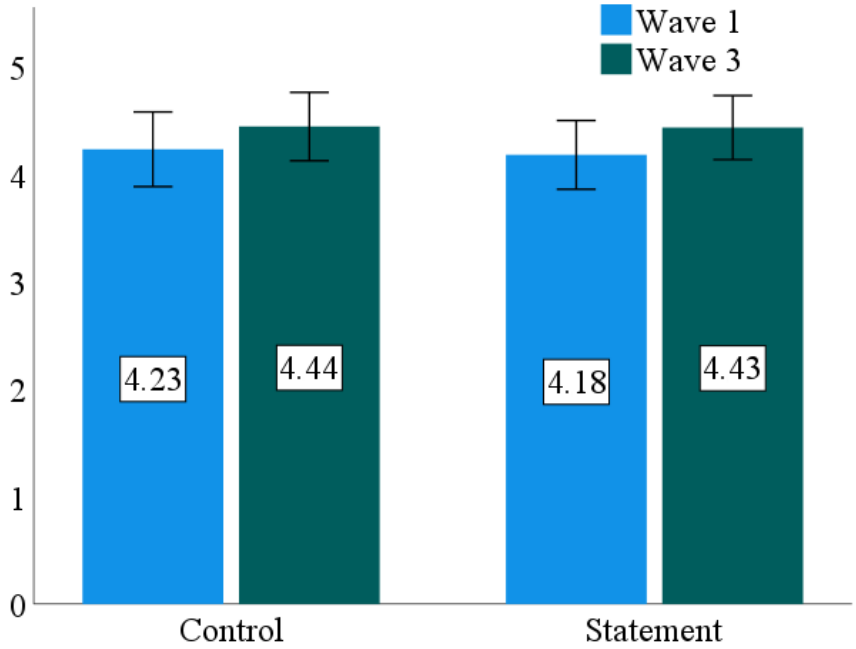


Notes: Colored bars represent mean scores. Error bars illustrate the standard error for each mean score. *N* Control = 152, *N* Statement = 156.

In Chapter Three: Research Methods & Experimental Design, we first examined Wave 1 mean scores in trust in each of the four institutions (political parties, federal parliament, politicians, and the European Union). We thus constructed a three-item index of trust in the political institutions (trust in the political parties, the federal parliament, and politicians). The entries in

Figure 13 below and Table A.5 in the appendix show the initial and final values on that index for each of the two groups. The two groups do not differ from each other in the first wave. At the end of the study, the statement and control groups show a similar level of trust in political institutions, with scores of, respectively, 4.43 (S.E. 0.15) and 4.44 (S.E. 0.16). We acknowledge that, although the scores improve, political trust remains relatively low at the end of the study. Nevertheless, all groups benefited from a slight improvement in their trust level, albeit one that is unlikely to be significant (see also the following section for an investigation of the statistical significance of the findings).

Figure 13. Political Trust Index at Wave 1 and Wave 3



Notes: Colored bars represent mean scores. Error bars illustrate the standard error for each mean score. *N* Control = 76, *N* Statement = 111.

4.2.2. Bivariate Between-Group Analysis

As a second analysis step, we proceed to *t*-test analyses to identify any statistically significant differences between the two groups' scores. *T*-test procedures make it possible to determine whether the means of the two groups are statistically different from each other.

T-tests for the statement effect are displayed in Table 10 below. We find that baseline IPE does not significantly differ between the control and statement exposure group ($t(306) = -.737$, $p = .462$). Yet, we find significant differences between control group and statement exposure group in Wave 2 and in Wave 3, significant at the 5% level (t Wave 2$(294.218) = -1.982$, $p = .048$) (t Wave 3$(306) = -2.088$, $p = .038$). This is a first indication of a positive statement exposure effect on IPE, in both the short and medium run.

In addition, we use Cohen's *d*[11] as a measure of effect size to assess the magnitude of the difference between the two groups. We use the following rule of thumb to interpret Cohen's *d:* A value of 0.2 represents a small effect size; a value of 0.5 represents a medium effect size; and value of 0.8 or higher represents a large effect size. The size of the statement effect in Wave 2 and Wave 3 is quite small, as we find a Cohen's *d* value of .226 in Wave 2, and .238 in Wave 3.

Table 10. *T*-tests for Statement Effect

	Control Group			**Statement Exposure**					
Variable	*M*	*SD*	*N*	*M*	*SD*	*N*	*df*	*t*	*p*
IPE Wave 1	2.99	.94	152	3.07	.94	156	308[1]	-.737	.462
IPE Wave 2	3.03	.94	152	3.22	.78	156	294.918	-1.982*	.048
IPE Wave 3	3.16	.88	152	3.35	.79	156	308[1]	-2.088*	.038
EPE Wave 1	2.47	.51	152	2.39	.68	156	289.633	1.212	.227
EPE Wave 2	2.53	.63	152	2.35	.68	156	308[1]	2.365*	.019
EPE Wave 3	2.66	.60	152	2.58	.68	156	308[1]	1.112	.267
Trust Wave 1	4.23	1.69	76	4.18	1.76	111	185[1]	.217	.828
Trust Wave 3	4.44	1.72	76	4.43	1.77	111	185[1]	.044	.965

Note: [1]Assuming equal variance. Statistical significance: * p-value ≤ 0.05.

Turning to EPE, *t*-tests reveal no statistically significant baseline difference between the control and statement exposure group ($t(289.633) = 1.212$, $p = .227$). In Wave 2, we find that the "statement exposure" group has a slightly lower average EPE score compared to the control group in Wave 2, significant at the 5% level ($t(306) = 2.365$, $p = .019$, Cohen's $d = .269$). Finally, we find no statistically significant Wave 3 difference between groups ($t(306) = 1.112$, $p = .267$). Hence, bivariate between-group analysis brings the first evidence of a slightly negative effect of statement

[11] The Cohen's *d* formula is the following: Cohen's $d = (M_1 - M_2) / \sqrt{SD_1^2 SD_2^2/2}$.

exposure in the short run, but this effect does not last one month after the statement exposure intervention.

Lastly, *t*-tests reveal no baseline difference in terms of political trust ($t(185) = .217$, $p = .828$). Neither can we find statistical evidence of statement exposure effect on political trust ($t(185) = .044$, $p = .965$).

Between-group analyses thus indicate a positive effect of VAA statements exposure on IPE in Waves 2 and 3, consistent with our first hypothesis. We also find evidence of a slightly negative effect of statement exposure on EPE in the short run. Yet, as Table 8 (Descriptive Statistics) reveals between-group differences on a range of factors, we must run further statistical tests controlling for these imbalances to disentangle their influence on the DV.

4.2.3. Multivariate Between-Group Analysis

As a third analysis step, we proceed to multivariate between-group analysis. We conduct further inferential analyses to gain insight into the relationships between several covariates and the DVs. Linear mixed regression analyses were used to investigate how multiple factors may relate to the outcome, while controlling for the effects of other variables. Given the nested structure of the data, the analyses focus on the individual pupil level (Level 1), also taking into account grouping variables for the classroom (Level 2) and school (Level 3). Before running our models, we examine our data to detect any eventual linearity, additivity, and multicollinearity issues, as well as the independence and normality of errors.

After conducting a multicollinearity test (see Table A.6 in the appendix), we start by examining the relationship between the intervention variable and the DVs. For each dependent variable, (i.e., IPE measured in Wave 2 and Wave 3, EPE measured in Wave 2 and Wave 3, and political trust measured in Wave 3), we present two regression models to assess immediate and medium-run VAA effects. Model I includes categorical variables for the statement effect and baseline level of the DV. We compare the "statement" group with the control group as the reference category. The control variable for baseline levels of the DV (measured in Wave 1) informs us of the importance of the baseline on post-intervention levels of the DV. Regarding IPE and EPE values that were measured at all time points, one might expect to see the importance of the baseline decreasing over time, between Wave 2 and Wave 3. In Model II, the full model, we consider covariates for the between-group imbalances we discussed in the previous sub-section,

namely, mother's educational attainment, education track, school year, and school SES (see also Table 3 in Chapter Three, Section 3.2.1).

In addition, we use *R*-squared as a measure of the goodness of fit of the models. *R*-squared indicates the proportion of variance in the outcome variable explained by the variables in each respective model. Our analyses also include model fit criteria for each model under study (log-likelihood, AIC, BIC). Log-likelihood reflects the likelihood of the observed data under the model. Lower values of the log-likelihood indicate a better fit of the model to the data. The Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) are statistical measures that assess the relative quality of a model based on a given set of data. AIC considers both the goodness of fit and the number of parameters in the model, while BIC places a greater penalty on models with more parameters. Lower AIC and BIC values indicate a better fit for the model. The models might reduce or gain in quality as we introduce variables. Likewise, these criteria are sensitive to the decreased number of individuals under study. Table 11 below presents linear mixed models for the statement effect on the three DVs measured in Wave 2 and/or Wave 3.

Table 11. Linear Mixed Models For Statement Effect

	IPE Wave 2				IPE Wave 3				EPE Wave 2				EPE Wave 3				Pol. Trust Wave 3			
	I	*p*	II	*p*	I	*p*	II	*p*	I	*p*	II	*p*	I	*p*	II	*p*	I	*p*	II	*p*
Statement Exposure	**.147**	.025	**.121**	.079	**.175**	.088	.221	.167	-.132	.365	-.163	.280	-.030	.757	.003	.981	-.043	.836	.001	.998
(ref. = Control Group)	**(.065)**		**(.069)**		**(.088)**		(.122)		(.133)		(.127)		(.074)		(.105)		(.208)		(.218)	
Baseline DV	**.684**	.000	**.688**	.000	**.619**	.000	**.619**	.000	**.583**	.000	**.589**	.000	**.552**	.000	**.558**	.000	**.586**	.000	**.552**	.000
	(.035)		**(.036)**		**(.037)**		**(.038)**		**(.052)**		**(.052)**		**(.052)**		**(.053)**		**(.060)**		**(.061)**	
Mother's Edu. Attainment:			-.058	.505			.015	.874			.061	.468			.047	.578			.266	.356
Higher Education (ref.= Secondary)			(.087)				(.092)				(.083)				(.084)				(.288)	
General Track			.062	.522			-.001	.993			.118	.391			-.055	.666			-.133	.674
(ref. = Technical)			(.096)				(.131)				(.129)				(.117)				(.316)	
School Year = 6			.100	.184			-.033	.687			.067	.365			.003	.970			-.111	.638
(ref. = 5)			(.075)				(.081)				(.073)				(.081)				(.236)	
School SES			-.038	.450			.031	.611			.021	.710			.030	.597			**.364**	.020
			(.051)				(.060)				(.056)				(.056)				**(.155)**	
Constant	**.976**	.000	**1.079**	.000	**1.293**	.000	**1.153**	.000	**1.030**	.000	**.810**	.003	**1.297**	.000	**1.139**	.000	**2.018**	.000	.708	.245
	(.114)		**(.197)**		**(.128)**		**(.238)**		**(.171)**		**(.248)**		**(.139)**		**(.241)**		**(.308)**		(.608)	
N Pupils	308		306		308		306		308		306		308		306		187		186	
R-squared	.583		.593		.503		.509		.309		.331		.278		.278		.370		.374	
Log Likelihood	544.099		543.603		566.987		570.784		516.553		511.426		504.982				659.218		651.410	
AIC	550.099		549.603		572.987		576.784		522.553		517.426		510.982				665.218		657.410	
BIC	561.270		560.705		584.138		587.865		533.723		528.528		522.133				674.862		666.972	
Within School Variance	.064		.082		.071		.080		.076		.058		.085		.146		.087		.112	
Between School Variance	.145		.178		.128		.104		.103		.124		.191		.150		.123		.135	

Notes: Standard errors are in parenthesis. *N* classes = 26, *N* schools = 12.

First, we investigate Hypothesis 1 on the statement effect on pre-voters' IPE. As regards IPE measured at Wave 2, Model I suggests there is a significant immediate effect of statements exposure on IPE (Coeff. = .147, p = .065). As we control for baseline IPE levels and groups' imbalances in Model II, we also find significant evidence of statement effect on IPE measured at Wave 2 (Coeff. Statement effect in the full model = .121, p = .069, η^2 = .011, ATE = 2.42%). Robustness testing including all participants from the first two waves is displayed in Table A.9 and corroborates that there is a positive immediate effect of statements exposure on IPE. A pre-voter that was exposed to VAA statements, on average, shows .121 points more on the five-point IPE index in Wave 2 than a pre-voter in the control group. This difference is statistically significant, yet the practical relevance of a .121-point difference on a five-point scale is relatively limited. In addition, we use Eta-squared (η^2)[13] as a measure of effect size in mixed regression. We use the following rule of thumb to interpret η^2: A value of 0.01 represents a small effect size, a value of 0.06 represents a medium effect size, and a value of 0.14 or higher represents a large effect size. The effect size η^2 value of .011 of the statement exposure coefficient indicates a small effect size of statement exposure on IPE in Wave 2. In terms of magnitude (or average treatment effect, ATE) of the statement effect on IPE in the short run, we can assert that statement exposure leads to a slight 2.42% decrease in the outcome. It must be noted that Model II shows the goodness of fit as rather high, as it explains 59.3% of the variance in IPE measured in Wave 2 (*R*-squared = .593). All goodness of fit criteria confirm that Model II is a slightly better fit than Model I. Only 8.2% of the variance of IPE measured in Wave 2 is at the classroom level and 17.8% of the variance is at the school level which indicates that IPE varies substantially between schools.

As regards the statement effect on IPE in the medium run, about one month after statements exposure, we find a statistically significant positive statement effect on IPE in Wave 3 in Model I, controlling for baseline IPE (Coeff. = .175, p = .088). We find no statistically significant statement effect on IPE in Wave 3 in the full model controlling for groups' imbalances. Yet, we find a substantial statement effect in Wave 3, as its coefficient is equal to .221 (*SD* = .122) with a p-value of .167. The η^2 value of .011 of the statement exposure coefficient indicates small effect size of statement exposure on IPE in Wave 3. At the end of the study, pre-voters exposed to VAA statements show an average IPE level of .221 points higher compared to the control group. In terms of magnitude of the statement effect on IPE, we can state that 4.42% of IPE change is due to statement exposure. The full model explains 50.9% of the variance in IPE measured in Wave 3. Yet, log-likelihood, AIC, and BIC criteria indicate that Model I can be considered as slightly better

[13] The Eta-squared formula is the following: $\eta^2 = t^2/(t^2 + df)$

fitting the data than Model II. Only 8% of the variance of IPE measured in Wave 3 is at the classroom level and 10.4% of the variance is at the school level.

These statistical analyses are in line with the graphical analyses displayed in Figure 11 and discussed in the previous section. We consistently identify a positive effect of statement exposure on IPE in Wave 2 and Wave 3. All in all, these findings indicate that there is both an immediate and medium-run statement effect on pre-voters' IPE. The statement effect was never examined before, and yet, our study reveals that VAA statements contribute to a modest increase of 4.42% in pre-voters' IPE, even one month after exposure. The findings lead us to confirm Hypothesis 1: "VAA statements exposure has a positive impact on pre-voters' internal political efficacy" (H1 supported).

Second, we investigate Hypothesis 2 about the statement effect on pre-voters' EPE. Regarding the immediate effect of statement exposure on EPE, Table 11 above reveals no statistically yet substantially significant effect. Contrary to our starting hypothesis, we find a negative statement effect on EPE in Wave 2. In the full model for EPE measured in Wave 2, we find that pre-voters who were exposed to VAA statements on average show .163 points less than the control group on the five-point EPE scale (SD = .127, p = .280). Yet this negative impact is quite negligible, as we find an η^2 value of .005 for the effect size of the "statement exposure" coefficient on EPE in Wave 2. This null effect is further confirmed by robustness tests displayed in Table A.9 in the appendix (linear mixed model using the full sample of participants from Wave 1 and Wave 2). In addition, the results do not show any significant statement effect on EPE in Wave 3. These findings are in line with the graphical analyses displayed in Figure 12 and discussed above. We must reject Hypothesis 2: "VAA statement exposure does not have a positive impact on pre-voters' external political efficacy" (H2 not supported).

Lastly, we turn to Hypothesis 3 about the statement effect on political trust. We do not see any significant statement effect on the outcome in either Model I or Model II. The mere appeal of 35-policy VAA statements in the classroom does not contribute to boosting pre-voters' political trust. Results from the linear mixed models for political trust do not corroborate our first hypothesis. VAA statements exposure does not affect pre-voters' political trust (H3 not supported).

It must be noted that the initial level of the DV is found to be significant in all models. None of the control variables are found to be significantly related to the DVs at the 10% level except school SES with political trust (Coeff. = .364, p = .020). We find no other statistically significant influence on the outcome, although intervention groups were found to differ on those

characteristics (see Table 3 in Chapter Three). Multicollinearity tests illustrated in Tables A.6 to A.8 in the appendix show that the outcome variables do not strongly correlate with any of the control variables. In addition, we must stress the low statistical power of these analyses due to the small sample size.

In sum, the empirical investigation of the statement effect hypotheses reveals a significant direct positive effect of statement exposure only on IPE. This is true both in the short and medium run. Yet, we pursue our empirical investigation by examining the differentiated statement effect on our three DVs across SES groups. Results are discussed in Section 4.2.4. below.

4.2.4. Differences Based on SES

As a final step in our analysis, we examine how pre-voters' SES influences the statement effect. Specifically, we pose the following research question: "To what extent is there a difference in VAA effect based on SES?" (RQ3). To measure SES, we use mother's educational attainment as a proxy (refer to Section 3.3.5 in Chapter Three for details on our methodological approach). To address the question of the differentiated VAA effect, we cannot use interactive multivariate models, i.e., including interaction terms for intervention groups and SES, due to the small size of the sample. We run parsimonious models to avoid overly complex models relative to the amount of data available. This, in turn, might lead to overfitting or exceedingly poor predictive performance by fitting the noise in the data. Hence, we conduct a bivariate between-group analysis to evaluate the statement effect between low- and high-SES pre-voters. We perform *t*-test analyses on the DV changes over time between low- and high-SES pre-voters of the control and the statement group to determine differentiated statement effects. We contextualize the influence of SES on the statement effect by comparing the changes in IPE, EPE, and political trust over time between low- and high-SES pre-voters (i.e., between Wave 1 and Wave 2, and between Wave 2 and Wave 3). The results of the *t*-tests are displayed in Table 12 below.

Table 12. *T*-tests for DV Change and Statement Effect by SES

	Low SES			High SES					
Variable	*M*	*SD*	*N*	*M*	*SD*	*N*	*df*	*t*	*p*
Internal Pol. Efficacy									
Control Group									
Wave 1 to Wave 2	.09	.60	25	.03	.60	127	148[1]	.491	.624
Wave 1 to Wave 3	.15	.66	25	.17	.63	127	148[1]	-.135	.893
Statement Group									
Wave 1 to Wave 2	.27	.89	31	.15	.61	125	37.384	.717	.478
Wave 1 to Wave 3	.41	.90	31	.28	.71	125	154[1]	.826	.410
External Pol. Efficacy									
Control Group									
Wave 1 to Wave 2	-.05	.52	25	.08	.47	127	148[1]	-1.195	.234
Wave 1 to Wave 3	.07	.42	25	.22	.57	127	148[1]	-1.233	.220
Statement Group									
Wave 1 to Wave 2	-.05	.72	31	-.04	.68	125	154[1]	-.116	.907
Wave 1 to Wave 3	.28	.75	31	.16	.63	125	41.272	.828	.412
Political Trust									
Control Group									
Wave 1 to Wave 3	-.48	1.33	9	.29	1.38	67	74[1]	-1.591	.116
Statement Group									
Wave 1 to Wave 3	.37	1.47	20	.21	1.72	91	109[1]	.366	.715

Notes: [1]Assuming equal variance. Statistical significance: *** p-value ≤ 0.001 • ** p-value ≤ 0.01 • * p-value ≤ 0.05 • $^{+}$ p-value ≤ 0.10.

The only significant DV-change difference based on SES is found among the control group for political trust. While the sense of political trust of nine low-SES pre-voters in the control group seems to deteriorate through study waves (Mean change = -.48, *SD* = 1.33), high-SES participants in the control group experience a slight rise in political trust (Mean change = .29, *SD* = 1.38, *t*(74) = -1.591, *p* = .116). The standard curriculum seems to (re)produce disparities in terms of political trust based on SES, yet we do not see such disparities among pre-voters who receive VAA statement intervention. We must draw careful conclusions on this finding, as its effect is quite small (η^2 = .03), the standard deviation of the mean is quite large, and the sample of low-SES pre-voters in the control group is small. Table A.10 in the appendix confirms that there is no statistically significant difference in IPE and EPE between low and high SES participants, as we consider the sample of all participants who partook in the first two waves of the study.

4.3. Discussion

Our study investigates the real causal impact of a VAA's use in the classroom on pre-voters' political efficacy and trust. In the present chapter, we investigated the hypotheses on VAA statement effects on our three DVs, namely, internal and external political efficacy, and political trust. Our study brings evidence of the actual influence of VAA statements on users' political attitudes. In that sense, our experimental study overcomes what observational studies could not achieve, notably bringing in prime evidence on VAA statements' impact on users. We present a summary of the hypothesis testing in Table 13 below. We can state that we found a significant positive VAA statement effect on pre-voters' sense of internal political efficacy (H1 confirmed). However, no evidence was found of VAA statement effects on pre-voters' EPE or political trust. In addition, we cannot support that VAA statement exposure succeeds in contributing to narrowing disparities in terms of efficacy and trust. In this concluding section, we highlight the key findings, their interpretation, and implications. On that basis, we bring some recommendations for VAA use as concluding remarks.

Table 13. Summary of Hypothesis Testing on Statement Effect

Hypothesis	Hypothesized effect	Results	Effect Found
IPE			
H1	**VAA statement exposure has a positive impact on pre-voters' internal political efficacy**	**Supported**	**+**
EPE			
H2	VAA statement exposure has a positive impact on pre-voters' external political efficacy	Not supported	0
Pol. Trust			
H3	VAA statement exposure has a positive impact on pre-voters' political trust	Not supported	0

Note: Author's own elaboration. Reported effect tendencies indicate positive (+) or null effects (0). No negative effect was found.

As regards our first set of hypotheses, we stated that VAA statements exposure has a positive impact on pre-voters' internal political efficacy (H1), external political efficacy (H2), and political trust (H3). We assumed that VAA statements enhance pre-voters' sense of IPE, as they raise awareness of policy issues. The findings showed both an immediate and medium-run statement effect on pre-voters' IPE. Pupils who were exposed to VAA statements showed greater levels of IPE in Waves 2 and 3 compared to the control group: "VAA statements exposure has a positive impact on pre-voters' internal political efficacy (H1 supported)". The mere exposure to VAA statements is sufficient stimulus to build up young users' sense of IPE. Being exposed to 35 policy statements and reflecting upon them leads to a brief but meaningful endeavor to improve

pre-voters' sense of IPE in the short and medium run. Hence, in a classroom setting, this kind of information is very valuable for pre-voters' empowerment. This is evidence that VAA statements may find their place in citizenship education programs. Yet, EPE and political trust appeared to be unaffected by VAA statements exposure. We cannot confirm that VAA statements exposure has a positive impact on pre-voters' external political efficacy and political trust (H2 and H3 not supported).

In addition, we examined the differentiated effect of VAA statements exposure on pre-voters' IPE, EPE, and political trust based on SES. The findings did not show that the VAA statements effect operates differently across SES groups. These findings indicate that VAA statements are not optimal learning materials to solve the SES gap in pre-voters' psychological engagement towards politics. Moreover, the results of the iterative multi-level regression models showed that pupils in more advantaged schools are more likely to develop political trust than those from disadvantaged schools. The mission of social equalization remains indeed a great challenge for Walloon schools and abroad. In the final chapter of the present thesis, we provide new insights into ways to improve VAA design for school education purposes.

Since VAA statements are found to have a significant influence on young users' IPE, VAA designers cannot ignore the importance of their careful selection and wording. In the relevant literature, emphasis is often put on the novelty of the apps in terms of interactive voting advice. Our study demonstrates that VAA statements are also an actual attitudinal medium, especially for the youngest users who have few encounters with policy issues. Yet, we investigate further the various kinds of VAA effects, as we assume that receiving advice in addition to VAA statements might play a role in building up their sense of political efficacy and trust. The following chapter investigates the advice effect hypotheses.

Chapter Five: The VAA Advice Effect on Pre-Voters

5.1. Introduction

For the purpose of assessing the role of Voting Advice Applications in the development of pre-voters' sense of political efficacy and trust, we distinguish three types of VAA effects. In the previous chapter, we examined the statement effect, and exposure to policy statements was found to have a significant positive influence on young users' IPE. In the present chapter, we pursue our empirical investigation of the lead research question of the present research: "To what extent does a VAA have an impact on pre-voters' political efficacy and trust?" (RQ1). We investigate the second type of VAA effects, i.e., the advice effect, in this second empirical chapter. We are therefore looking at the currently understudied relationship between advice exposure as an independent variable (IV) and IPE, EPE, and political trust as dependent variables (DVs).

We extensively develop our hypotheses on advice effect in Section 2.5.2 in Chapter Two. We start from the premise that VAAs do not only provide information about policy issues, but they also analyze this information and assist the user in processing this information in light of an easy-to-understand results page (Garzia, 2010). We expect that pre-voters being introduced to what the political parties offer and having a "political mirror" held in front of them positively influence our three DVs. The VAA output provides users with the tools to recognize their proximity to political parties. VAA advice provides the cues needed to understand the workings of the political landscape. This kind of information might ultimately provide young people with helpful tools to boost their ability to understand and participate in politics, and to feel accordingly (Pasek et al., 2008). Therefore, we hypothesize that "VAA advice exposure has a positive impact on pre-voters' internal political efficacy" (Hypothesis 4).

In addition, we assume that citizens refer to their sense of proximity with the political parties' offer to assess the quality of political representation. Hence, VAA users might take cues from VAA advice for evaluating the quality of representation. As a result, using a VAA may provide one with insights into their own political views, which are to some extent matched by at least one of the available political parties; this, in turn, boosts one's sense of EPE. We hypothesize that "VAA advice exposure has a positive impact on pre-voters' external political efficacy" (Hypothesis 5).

Lastly, the sense of congruence between citizens and their representatives boosts one's satisfaction with institutions (Mayne & Hakhverdian, 2017). Citizens readily grant legitimacy to political parties, politicians, or elected representatives when they are perceived as satisfying their interests. With a better understanding of the political landscape, citizens are willing to trust political institutions to take political action on their behalf (Craig et al., 1990). Hence, we hypothesize that "VAA advice exposure has a positive impact on pre-voters' political trust" (Hypothesis 6).

On another note, the present empirical investigation of the advice effect allows us to put forward some answers to our two other research questions. We expect to find a medium-term effect about one month after advice exposure. We assume that it may take time, consideration, support by teachers, or maturation for pre-voters' attitudes to be impacted by advice exposure. Therefore, we tackle the gap in research on VAAs' lasting impact and ask: "To what extent does a VAA have a lasting impact on pre-voters' political efficacy and trust?" (RQ2). Finally, we examine the extent to which VAAs address the inequalities in political efficacy and trust based on individuals' socio-economic backgrounds. We acknowledge that youngsters from a disadvantaged social background are more likely to be the least knowledgeable about politics, and to have little sense of efficacy or trust toward political institutions. As a political learning activity, VAAs must stimulate the sense of efficacy and trust of all users, not only those from privileged social categories, in order to lever inequalities. Hence, we tackle the gap in research addressing inequalities and ask: "To what extent is there a difference in VAA effect based on SES?" (RQ3).

5.2. Analyses and Results

In the present section, we turn to the empirical analyses and discussion of results as regards the advice effect hypotheses. A thorough description of the research methods and design is provided in Chapter Three. "Research Methods & Experimental Design". In that chapter, we also extensively discussed the constructs of the three dependent variables of interest, i.e., internal political efficacy, external political efficacy, and political trust.

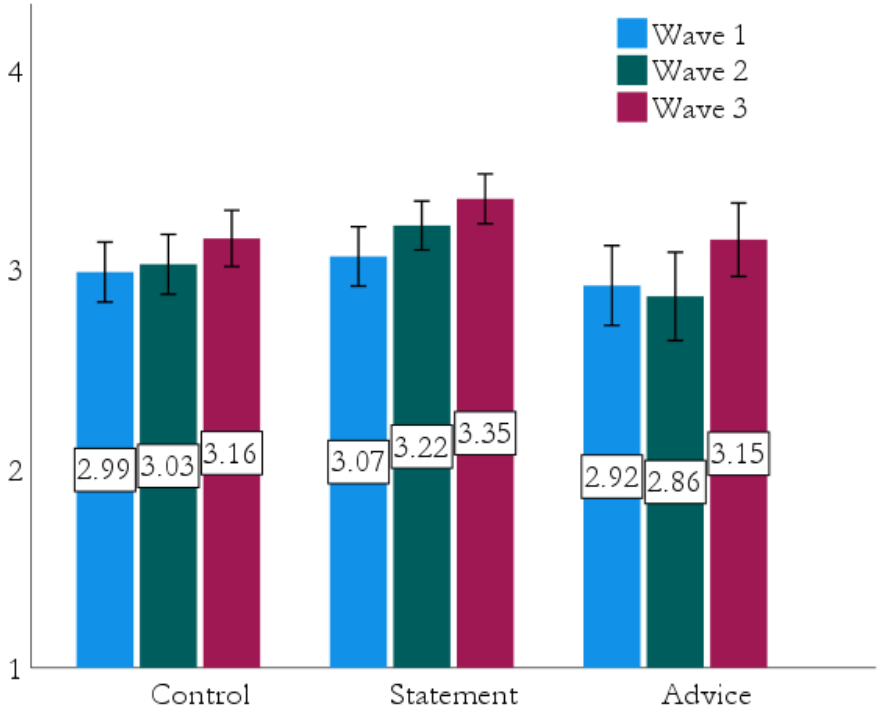
We investigate the advice effect on the three DVs we just mentioned. The IV of interest here is VAA advice exposure. The focus is set on the advice group, i.e., pre-voters who are assigned to use the *Test électoral éducatif*. Pre-voters assigned to the advice group were tasked with answering the 35 policy statements, and received voting advice as a result. To assess whether any change in the DVs is genuinely due to VAA advice – and not other confounding factors or other VAA features such as policy statements – we investigate comparisons between pre-voters exposed to VAA advice with the control and statement group. First, we compare the advice group to the control group to provide a baseline to compare results against which to measure the effects of advice exposure. By doing so, we become able to claim whether VAA advice brings better political efficacy and trust results than a standard school curriculum. Second, we compare the advice group's results with those of the statement group. By comparing the two groups, we can verify whether any change in the DVs is due to the "advice effect" of a VAA (comprised of the positioning on 35 statements, use of the VAA features, and receiving voting advice) rather than to the "statement effect" we explored in the previous chapter, i.e., the mere information stimulus contained in the policy statements of the VAA. By doing so, we become able to claim what makes a difference in VAAs' impact on political efficacy and trust, and whether the VAA output has an added value to mere policy statements information.

To investigate our research questions and hypotheses about the advice effect, we proceed with a four-step analysis of each DV: Descriptive within-group analysis, bivariate between-group analysis, multivariate between-group analysis, and bivariate between-group analysis of DV changes differences between low- and high-SES pre-voters. We examine the advice effect in both the short and medium run for IPE and EPE. Yet, we only assess medium-run impact regarding political trust (see Chapter Three for a thorough discussion of the research design).

5.2.1. Descriptive Within-Group Analysis

As a first analytical step, we provide descriptive statistics for repeated measurements of IPE across time. The entries in Figure 14 below show the values on the IPE index for each of the three groups in the three waves. Table A.11 in the appendix displays the within-group mean IPE scores and differences between waves. The first set of bars illustrates the growth in IPE of the control group. The latter shows the lowest improvement as they experience a 0.17 difference between Wave 3 and Wave 1. The evolution of the control group indicates that the normal curriculum contributes only marginally to the improvement of the pupils' IPE level over the months. The "statement effect" group shows a consistent and positive evolution between waves. Table A.11 indicates that the "statement effect" group shows the greatest Wave 1 to Wave 3 growth in IPE, reporting a 0.28 improvement on the IPE scale.

Figure 14. IPE across Time: Error Bar Graphs

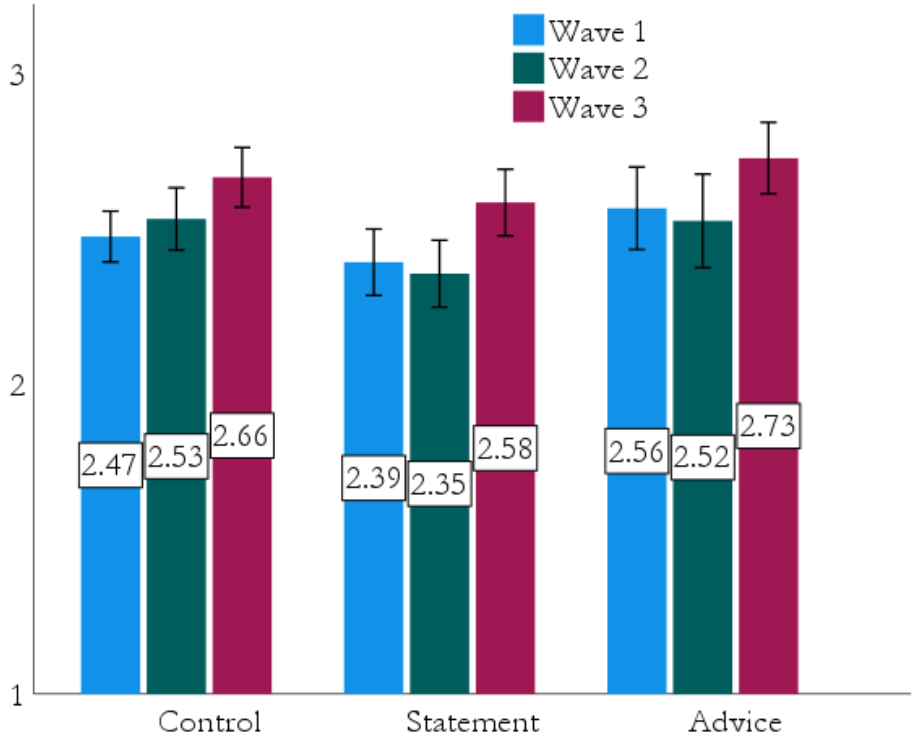


Notes: The colored bars represent mean scores. Error bars illustrate the standard error for each mean score. *N* Control = 152, *N* Statement = 156, *N* Advice = 92.

The last set of bars illustrates the evolution in IPE of the "advice effect" group. Respondents in this group show a baseline score of 2.92 on the 1–5 IPE scale. At Wave 2, they show a slight drop in their sense of IPE as they show a mean value of 2.86. Their level of IPE then increases up to 3.15 in Wave 3. Hence, in the short run there is an indication of a slightly negative effect of advice exposure on IPE. We must perform statistical tests to draw a conclusion on the VAA advice effects on IPE, as the error bars greatly overlap.

Turning to EPE, Figure 15 below illustrates the three intervention groups' evolution trends on the comprehensive index defined by the five components for EPE. Table A.12 in the appendix displays detailed within-group mean EPE scores, and differences between waves. As we look at the first set of bars, the change in the control group indicates that the normal curriculum contributes to a consistent but marginal improvement in the sense of EPE. In contrast, we can see that the other two groups experience a minor deterioration in their EPE level as an immediate effect of exposure to VAA advice or statements. On average, all groups showed an improved sense of EPE at the end of the study. Table A.12 indicates that the advice group showed an improvement of 0.17 on the EPE scale between Wave 1 and Wave 3. The statement and control groups both show a 0.19 score improvement between Wave 1 and Wave 3. It has to be noted that the error bars overlap greatly, which indicates a marginal change in the outcome. This is the first indication that it is unlikely to find the advice effect on EPE.

Figure 15. EPE across Time: Error Bar Graphs

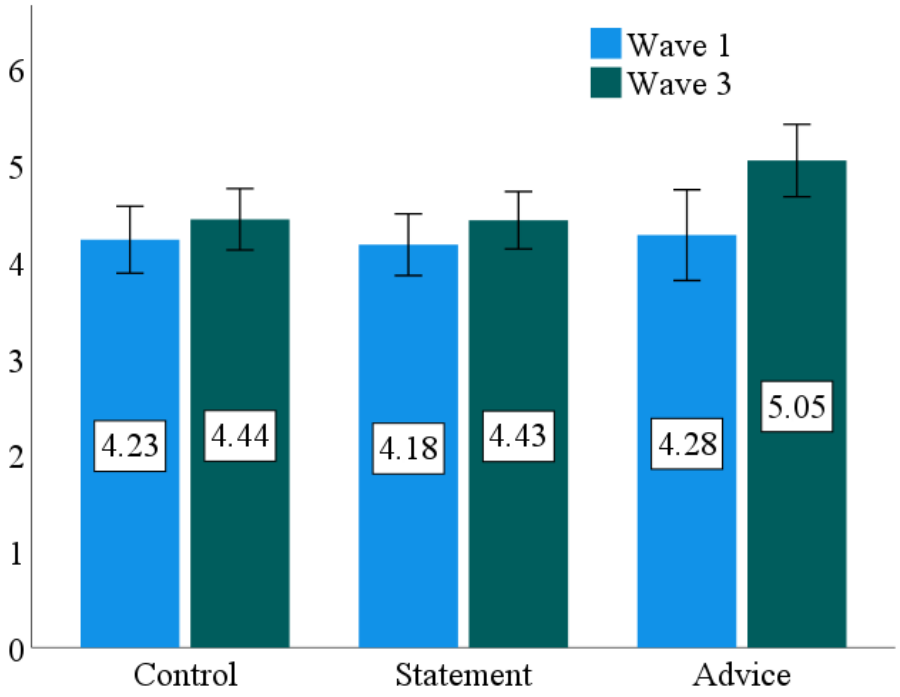


Notes: The colored bars represent mean scores. Error bars illustrate the standard error for each mean score. *N* Control = 152, *N* Statement = 156, *N* Advice = 92.

Turning to political trust, the entries in Figure 16 below show the initial and final values on the political trust index for each of the three groups. At the end of the study, the control group and statement group show a similar level of trust in political institutions with a score of, respectively, 4.43 (S.E. 0.15) and 4.44 (S.E. 0.16). The advice group indeed shows the highest score on the political trust scale. Respondents in the "VAA advice" group show a mean score of 5.05

(S.E. 0.19) on the 0–10 political trust index scale, while the overall average is 4.55. Although the three groups do not differ from each other in the first wave, the "VAA advice" group stands out at the end of the study. The advice group has made the best average progress on the political trust scale (0.77 points) as the statement and control group show a similar increase of 0.21–0.25 points on the 11-point political trust scale (see Table A.13 in the appendix). This is a first indication of a positive advice effect on political trust. In Section 5.2.2 below we test whether these findings hold as we proceed to inferential statistics.

Figure 16. Political Trust Index at Wave 1 and Wave 3



Notes: The colored bars represent mean scores. Error bars illustrate the standard error for each mean score. *N* Control = 76, *N* Statement = 111, *N* Advice = 63.

5.2.2. Bivariate Between-Group Analysis

As a second analysis step, we proceed to bivariate between-group inferential analyses. Homogeneity of variances (ANOVA) tests are used to identify any statistically significant differences between the groups' scores. Between-group ANOVA allows us to find how means differ between groups. One-way ANOVA tests are reported in Table A.14 in the appendix, and indicate whether the difference in mean score between the three groups reaches significance. In turn, if the *F*-test suggests significant group differences, we follow up the analysis with post-hoc tests, i.e., Tukey's HSD. The latter allows for comparing the means of each group with the "advice effect" group (i.e., Advice vs Control, and Advice vs Statement). Between-group comparisons for IPE, EPE, and political trust at all time-points are illustrated in Table 14 below.

Table 14. Advice Effect: Between-Group Comparisons

	Intervention group	Mean Difference	*p*
IPE Wave 1	Advice vs Control	-.067	.853
	Advice vs Statement	-.146	.469
IPE Wave 2	Advice vs Control	-.161	.392
	Advice vs Statement	-.356*	.011
IPE Wave 3	Advice vs Control	-.006	.998
	Advice vs Statement	-.205	.164
EPE Wave 1	Advice vs Control	.091	.498
	Advice vs Statement	.174^{+}	.079
EPE Wave 2	Advice vs Control	-.007	.997
	Advice vs Statement	.170	.151
EPE Wave 3	Advice vs Control	.062	.737
	Advice vs Statement	.143	.197
Trust Wave 1	Advice vs Control	.047	.985
	Advice vs Statement	.100	.931
Trust Wave 3	Advice vs Control	.610*	.048
	Advice vs Statement	.619*	.035

Notes: * The mean difference is significant at the 0.05 level • $^{+}$ The mean difference is significant at the 0.10 level.

First, regarding IPE, we find no statistically significant baseline difference between groups (F (2,397) = .724; p = .486). The ANOVA test can be considered robust regarding IPE measured in Wave 2 and Wave 3. There is a statistically significant difference between groups at the 5% level in Wave 2 (F (2,397) = 4.536; p = .011). The post-hoc tests illustrated in Table 14, above, reveal that the difference at Wave 2 lies between the two intervention groups. The "advice effect" group shows a lower average IPE score compared to the "statement effect" group in Wave 2 (Mean difference = -.356, p = .011). Bivariate analyses tend to show a negative immediate statement effect on IPE. Yet, before drawing any conclusion, we test whether these findings hold as we control for groups' imbalances in the following subsection.

The global difference between groups is also found to be statistically significant at the 10% level in Wave 3 (F (2,397) = 2.695; p = .069). Yet, Table 14 above reveals that the "advice effect" group does not significantly differ from the two other groups. Findings from our investigation of the statement effect hypothesis in the previous chapter rather show that between-group differences in IPE in Wave 3 are found between the statement and control group. This is a first indication that, even though we find a statement effect on IPE in the medium term, we do not find any significant advice effect.

Turning to EPE, the one-way ANOVA reveals that there is a statistically significant difference in EPE between at least two groups in Wave 1 (F (2,397) = 2.381; p = .094). Tukey's

HSD Test for multiple comparisons found that the mean value of EPE in Wave 1 was significantly different between the "statement effect" and "advice effect" groups at the 10% level (Mean difference = .174, p = .079). Before intervention, pupils in the "advice effect" group hence show higher average EPE compared to the "statement effect" group.

In Wave 2, i.e., immediately after intervention, the ANOVA test also reveals a statistically significant difference in EPE between groups (F (2,397) = 3.261; p = .039). Yet, the advice effect group does not significantly differ from the two other groups. Rather, as discussed in Chapter Four, the "statement effect" group has a lower average EPE score compared to the control group in Wave 2. Finally, we find no statistically significant Wave 3 difference between groups (F (2,397) = 1.599 p = .203).

We find statistically significant baseline differences in EPE between groups. In addition, we expect to find differences in EPE between groups depending on a range of characteristics, as Table 3 (Descriptive Statistics) above reveals between-group differences. For both reasons, we perform further statistical tests controlling for baseline EPE and these imbalances, in order to draw conclusions on the advice effect hypothesis. Results are displayed and discussed in Section 5.2.3 below.

Lastly, regarding political trust, we find no significant between-group difference in political trust at the beginning of the study (F (2,247) = .068; p = .934). Yet, the ANOVA test can be considered robust for Wave 3 political trust. There is indeed a statistically significant difference between groups at Wave 3, as demonstrated by one-way ANOVA (F (2,247) = 3.648; p = .027). Tukey post-hoc tests displayed in Table 14 show that the "advice effect" group is statistically more trusting than the control group (Mean difference = .610, p = .048) and the statement group (Mean difference = .619, p = .035).

Bivariate between-group analysis thus tends to show a positive advice effect on political trust. We cannot draw any conclusion on Hypothesis 6 yet, as Table 3 (Descriptive Statistics) above reveals between-group differences on a range of characteristics. Hence, we perform a further multivariate between-group analysis in the subsection below to account for these pre-intervention imbalances, as well as the influence of initial political trust on post-intervention values of political trust.

5.2.3. Multivariate Between-Group Analysis

As a third analysis step, we proceed to multivariate between-group analysis. We conduct further inferential analyses to gain insight into the relationships between several covariates and the DVs. Linear mixed regression analyses were used to investigate how multiple factors may relate to the outcome, while controlling for the effects of other variables. We follow the same methodology as the analyses discussed in Section 4.2.3 of the previous chapter on the statement effect. To investigate the advice effect hypotheses, we compare the DVs' level of the advice group with both the control and statement groups. For each DV, Model I includes two categorical variables for advice exposure, and a control variable for the baseline level of the outcome variable (measured at Wave 1). In Model II, namely the full model, we consider covariates for group imbalances, i.e., mother's educational attainment, educational track, school year, and school SES. Table 15 below presents the linear mixed models for advice effect on the three DVs measured in Wave 2 and/or Wave 3.

First, we investigate Hypothesis 4 on the advice effect on pre-voters' IPE. As regards IPE, measured at Wave 2, Model I suggests there is no significant immediate effect of advice exposure on IPE compared to the control group. Yet, we find significant positive effects of statement exposure compared to advice exposure (Coeff. =-.261, p = .001). We also find a statistically significant correlation between initial IPE and IPE measured in Wave 2 (Coeff. = .708, p <.001).

Then, we control for imbalances in Model II. We find that the pupils exposed to VAA advice show lower IPE in Wave 2 compared to both the control (Coeff. = -.174, p = .096, η^2 = .007, ATE = 3.48%) and statement groups (Coeff. = -.271, p = .002, η^2 = .025, ATE = 5.42%). A pre-voter that was exposed to VAA advice shows, on average, .174 points (or 3.48%) less on the five-point IPE index in Wave 2 than a pre-voter in the control group, and .271 points (or 5.42%) less than a pre-voter exposed to VAA statements only. The effect size η^2 values of .007 and .025 of the advice exposure coefficients indicate a small effect size of advice exposure on IPE in Wave 2. There is 8.3% variance in IPE measured in Wave 2 within each school, and 17.1% variance between different schools. The high variance at the school level confirms that it was necessary to use multilevel analysis for this data set. In addition, the *R*-squared of the full model indicates that 59.3% of the observed variation can be explained by the model's inputs. Looking at the log-likelihood, AIC, and BIC values of Models I and II, the full model can be considered significantly better than Model I. Hence, contrary to what was expected, one can state that there is a negative advice effect in the short run. This is further confirmed by robustness tests displayed in Table A.15 in the

appendix (linear mixed models for the advice effect on IPE and EPE measured in Wave 2, considering the sample of all participants who partook in the first two waves of the study).

As regards the advice effect in the medium run, the full model, i.e., Model II, explains 50.9% of the variation in IPE measured at the end of the study (*R*-squared (Model II) = .509). The AIC and BIC coefficients for both models do not significantly differ. The two models express comparable goodness of fit with or without covariates. Looking at regression coefficients, we find no statistically significant intervention effect in either of the two models. We only find a statistically significant coefficient for baseline IPE (Coeff. Initial IPE (Model II) = .628, p <.001). Unsurprisingly, the importance of initial IPE decreases over time as its coefficient is lower in Wave 3 than in Wave 2 in their respective full model. Here again, no covariate is significantly related to IPE measured in Wave 3. The correlation matrix displayed in Table A.6 in the appendix reveals that only the three IPE variables measured at the three time points are strongly correlated with each other. We find no other strong interdependence among our independent and dependent variables.

The multivariate analyses displayed in Table 15 below are in line with the bivariate analyses discussed in Section 5.2.2 above. The immediate negative advice effect is found to be stronger, as we include control variables for groups' imbalances. This further confirms the relevance of multivariate analyses as it influences the strength of the IVs' coefficients. These findings allow us to answer Hypothesis 4. In Wave 2, pupils who were exposed to VAA advice do not show higher levels of IPE, as hypothesized. It is rather the opposite, as, controlling for imbalances and initial IPE, pre-voters in the advice group show lower IPE compared to control and statement groups. We must reject Hypothesis 4: VAA advice exposure has no positive impact on pre-voters' internal political efficacy. These findings also bring evidence to answer our second research question regarding the medium-term advice effect on IPE. At the end of the study, we do not find any advice effect on IPE, in contrast to van de Pol's (2016) findings that revealed a positive advice effect on Dutch voters' IPE. In Wave 3, pre-voters who were exposed to VAA advice do not show significantly different levels of IPE, compared to the control and statement groups. Yet, one might wonder whether there is a differentiated advice effect on IPE based on pre-voters' SES. We explore our third research question in the following section.

Table 15. Linear Mixed Models for Advice Effect

	IPE Wave 2				IPE Wave 3				EPE Wave 2				EPE Wave 3				Pol. Trust Wave 3			
	I	*p*	II	*p*	I	*p*	II	*p*	I	*p*	II	*p*	I	*p*	II	*p*	I	*p*	II	*p*
Advice Exposure	**-.116**	.151	**-.174**	.096	.073	.549	.132	.380	-.037	.791	-.091	.518	.011	.908	-.005	.961	**.602**	**.014**	**.550**	**.038**
(ref. = Control Group)	**(.081)**		**(.088)**		(.114)		(.139)		(.134)		(.092)		(.084)		(.088)		**(.243)**		**(.263)**	
Advice Exposure	**-.261**	.001	**-.271**	.002	-.112	.291	-.109	.374	.094	.425	.060	.543	.041	.629	.036	.699	**.645**	**.005**	**.511**	**.037**
(ref. = Statement Exposure)	**(.080)**		**(.088)**		(.100)		(.118)		(.112)		(.090)		(.080)		(.087)		**(.226)**		**(.244)**	
Baseline DV	**.708**	.000	**.709**	.000	**.623**	**.000**	**.628**	**.000**	**.585**	**.000**	**.583**	**.000**	**.528**	**.000**	**.523**	**.000**	**.584**	**.000**	**.560**	**.000**
	(.031)		**(.032)**		**(.032)**		**(.033)**		**(.046)**		**(.047)**		**(.044)**		**(.045)**		**(.051)**		**(.052)**	
Mother's Edu. Attainment:			-.033	.667			.064	.425			.061	.405			.035	.618			.376	.125
Higher Education (ref.= Secondary)			(.077)				(.080)				(.073)				(.070)				(.244)	
General Track			.045	.598			-.060	.594			.150	.152			.044	.616			-.341	.191
(ref. = Technical)			(.086)				(.111)				(.085)				(.082)				(.260)	
School Year = 6			.092	.187			-.008	.910			.049	.489			.014	.841			-.136	.521
(ref. = 5)			(.070)				(.074)				(.070)				(.069)				(.211)	
School SES			-.043	.356			-.006	.906			.018	.693			.011	.801			**.290**	**.032**
			(.046)				(.053)				(.046)				(.045)				**(.135)**	
Constant	**.789**	**.000**	**.880**	**.000**	**1.346**	**.000**	**1.372**	**.000**	**.998**	**.000**	**.741**	**.004**	**1.364**	**.000**	**1.255**	**.000**	**2.630**	**.000**	**1.585**	**.005**
	(.113)		**(.206)**		**(.124)**		**(.241)**		**(.149)**		**(.223)**		**(.129)**		**(.214)**		**(.285)**		**(.562)**	
N Pupils	400		382		400		382		400		382		400		382		250		238	
R-squared	.583		.593		.503		.509		.309		.331		.278		.278		.370		.374	
Log-Likelihood	694.689		691.001		726.678		726.809		652.418		643.755		624.985		632.173		845.580		828.425	
AIC	700.689		697.001		732.678		732.809		658.418		649.755		630.985		638.173		851.580		834.425	
BIC	712.541		708.733		744.577		744.630		670.270		661.528		642.884		649.994		861.997		844.739	
Within School Variance	.074		.083		.072		.079		.047		.063		.089		.117		.079		.083	
Between School Variance	.163		.171		.128		.104		.179		.160		.197		.153		.156		.172	

Notes: Standard errors are in parenthesis. *N* classes = 38, *N* schools = 17.

Turning to EPE, we do not find any significant advice effect on EPE in any model measured in Wave 2 or Wave 3. Robustness checks for the immediate advice effect displayed in Table A.15 in the appendix corroborate the null finding. These findings are in line with the graphical analyses displayed in Figure 15 and discussed above. Pre-voters who receive VAA advice do not show greater levels of EPE in the short and medium run than those who receive the standard curriculum (control group), or those who were exposed to VAA statements only. We must discard Hypothesis 5: VAA advice exposure has no positive impact on pre-voters' external political efficacy (H5 not supported). Notwithstanding that, one might wonder whether VAA advice effectively contributes to narrowing gaps in EPE between less and more socio-economically privileged pre-voters. We explore this question in the following subsection.

Lastly, as we investigate Hypothesis 6 regarding the advice effect on political trust, just as Model I, the full model demonstrates that advice exposure and initial trust have an impact on the final values of political trust. As hypothesized, the advice group shows a significantly higher average of trust than the control group (Coeff. = .550, p = .038, η^2 = .019, ATE = 5%) and statement group (Coeff. = .511, p = .037, η^2 = .019, ATE = 4.65%) with a small effect size. It is found that a small, 5% change in political trust can be attributed to advice exposure, relative to the mean outcome value for the control group, or 4.65%, as compared with statement exposure. In addition, initial trust remains a significant predictor of the final values of the DV (Coeff. = .560, p <.001). Unsurprisingly, political trust being a rather stable attitude, one's baseline political trust is strongly linked with one's post-intervention political trust: The higher the baseline political trust, the higher the political trust at the end of the study.

We also include covariates in our analyses to control for pre-intervention imbalances between intervention groups (see Table 3 above). Multicollinearity tests illustrated in Table A.8 in the appendix reveal that political trust measured at Waves 1 and 3 are found to correlate with each other. Although no potential covariates of trust are found to be highly correlated with the DV in multicollinearity tests, linear mixed analyses displayed in Table 15 reveal significant relationships between some control variables and political trust.

As we consider mother's educational attainment as a proxy for SES, we find a substantial difference between low- and high-SES pre-voters (Coeff. Mother's Edu Attainment = .376, *SE* = .244). At the end of the study, high-SES pre-voters tend to show higher political trust by .376 points on the 11-point scale, compared to low-SES pre-voters. We also acknowledge a substantial yet not statistically significant correlation between educational track and political trust (Coeff. General

Track = -.341, *SE* = .260). One might assume that pupils enrolled in technical education show higher levels of political trust in Wave 3 compared to those enrolled in general education. Yet, descriptive statistics in Table 3 in Chapter Three show that pupils on the technical track are slightly overrepresented in the advice group. Nonetheless, we do not see any significant difference in political trust at the end of the study between fifth and sixth graders. Last, we find that the effect of average SES at the school level is significantly and positively related to the outcome at the 5% level (Coeff. School SES = .290, p = .032). This indicates that the more socio-economically advantaged a school is, the higher the level of political trust its pupils will show at the end of the study.

The full model does not gain as much in explanatory power as Model I, as we include covariates. The *R*-squared value for Model II indicates that 37.4% of the variance in political trust measured at the end of the study is explained by the full model. AIC and BIC criteria indicate that the full model can be considered as better fitting the data than Model I. There is 8.3% variance in political trust within each school, and 17.2% variance between different schools.

In Hypothesis 6, we assume we will find a positive effect of VAA advice on participants' political trust. Linear mixed models (see Table 15 above) reveal that the effect of VAA advice exposure is statistically significant, and positively predicts political trust. Both models confirm the impact of VAA advice exposure on political trust with a statistically significant positive relation. Those who were exposed to VAA output show a .550-point higher trust level compared to the control group, and .511 higher trust compared to the statement group. These findings corroborate Hypothesis 6: "VAA advice exposure has a positive impact on pre-voters' political trust" (H6 supported). This leads us to say that the personalized "political profile" feature of VAAs does have an added value in building up pre-voters' trust. VAA statements on policy issues do not constitute sufficient information stimulus to affect pre-voters' perception of political institutions. The results rather show that statements on policy issues must be supplemented by political mirror information to influence pre-voters' political trust. Our findings might be evidence that the proximity-satisfaction mechanism demonstrated by Mayne & Hakhverdian (2017) might be at play with VAA advice. Namely, VAA advice might succeed in conveying a sense of proximity between citizens and their representatives, which in turn boosts citizens' satisfaction with institutions. On top of that, we want to find out whether pre-voters make different gains in political trust from advice exposure based on their socio-economic background. We explore the last research question on the differentiated advice effect based on SES in the following section.

5.2.4. Differences Based on SES

In Section 4.2.4 of the previous chapter (see also Table 12), we discussed the differentiated statement effect based on SES level. We found that pre-voters in the statement group do not show significantly different DV changes between low- and high-SES participants. The only significant result we found is that, within the control group, the sense of political trust of low-SES pre-voters seems to deteriorate across the study waves, while high-SES participants experience a slight rise in political trust. In the present subsection, we examine DV change based on SES among the subset of pre-voters exposed to VAA advice. We perform *t*-test analyses on the DV changes over time (i.e., between Wave 1 and Wave 2, and between Wave 1 and Wave 3) across low- and high-SES pre-voters of the advice group to determine the differentiated advice effects. The results of the *t*-tests are displayed in Table 16 below.

T-tests reveal no statistically or substantially significant DV change differences between low- and high-SES pre-voters for any of the DVs. Therefore, the results indicate that there is no significant differentiated advice effect based on SES. Altogether, these findings bring new evidence to answer our last research question about the political resource gaps across pre-voters. Low-SES pre-voters do not make different gains with VAA advice compared to high-SES pre-voters. Robustness checks displayed in Table A.16 in the appendix (differences in the immediate match effect on IPE and EPE) corroborate the findings.

Table 16. *T*-tests for DV Change and Advice Exposure by SES

	Low SES			**High SES**					
Variable	*M*	*SD*	*N*	*M*	*SD*	*N*	*df*	*t*	*p*
Internal Pol. Efficacy									
Wave 1 to Wave 2	-.11	.55	29	-.06	.70	63	90[1]	-.291	.772
Wave 1 to Wave 3	.19	.68	29	.26	.71	63	90[1]	-.437	.663
External Pol. Efficacy									
Wave 1 to Wave 2	-.08	.62	29	-.06	.62	63	90[1]	-.167	.868
Wave 1 to Wave 3	.21	.74	29	.10	.50	63	90[1]	.790	.432
Political Trust									
Wave 1 to Wave 3	.69	1.01	17	1	1.70	46	61[1]	-.640	.525

Notes: [1]Assuming equal variance. Statistical significance: *** p-value ≤ 0.001 • ** p-value ≤ 0.01 • * p-value ≤ 0.05 • $^{+}$ p-value ≤ 0.10.

5.3. Discussion

In the present chapter, we investigated the hypotheses regarding the VAA advice effect on our three DVs, namely, internal and external political efficacy, and political trust. We present a summary of the hypothesis testing in Table 17 below. We can state that we found a significant positive impact of VAA advice on only one of our DVs. We found a positive advice effect on political trust (H6 confirmed). However, no evidence of a positive VAA advice effect on pre-voters' political efficacy was found. In addition, we cannot support that VAA advice exposure succeeds in contributing to narrowing disparities in terms of efficacy and trust. In this concluding section, we highlight the key findings, their interpretation, and implications.

Table 17. Summary of Hypothesis Testing on Advice Effect

Hypothesis	Hypothesized effect	Results	Effect Found
IPE			
H4	VAA advice exposure has a positive impact on pre-voters' internal political efficacy	Not supported	- in the ST; 0 in the MT
EPE			
H5	VAA advice exposure has a positive impact on pre-voters' external political efficacy	Not supported	0
Pol. Trust			
H6	**VAA advice exposure has a positive impact on pre-voters' political trust**	**Supported**	**+**

Note: Author's own elaboration. Reported effect tendencies indicate positive (+), negative (-), or null effects (0).

Because VAA outputs provide users with the tools to recognize their proximity relative to various political parties, we hypothesized that VAA advice exposure has a positive impact on pre-voters' internal political efficacy (H4), external political efficacy (H5), and political trust (H6). We must refute our hypotheses on VAA advice effects on pre-voters' IPE and EPE (H4 and H5 not supported). Our findings rather showed that receiving advice in addition to VAA statements reduces the immediate sense of IPE. As we compared the "advice effect" group with both the control and statement groups, it seems that pupils who receive an indication of their ideological closeness to the parties as a result of the 35 opinion questions became unsettled in their sense of internal political efficacy. In contrast, Chapter Four showed that those who do not obtain results from their opinion survey (statement group) do not show a deteriorated sense of IPE. Our findings rather demonstrated that mere exposure to VAA statements leads to an improvement in the feeling of IPE (see Chapter Four above). The "voting advice" thus seems to make pupils uneasy at first. This is a very puzzling finding, as it demonstrates that VAAs can have a detrimental effect on youth empowerment, i.e., opposite to the intended effect. We speculate that such politically inexperienced

young people are unsettled by VAA advice information, as they may have difficulty interpreting it on their own. Indeed, we found that they tend to restore their initial level of IPE by the end of the study, with time, maturation, or learning (see Section 2.5.4 in Chapter Two on medium-term effects). In the general conclusion of this thesis, we further discuss the role of classroom deliberation and teacher guidance in processing voting advice information.

Regarding the external aspect of political efficacy, we did not find VAA advice exposure to have a significant impact on EPE in the short or medium term. Our findings on IPE and EPE are in line with claims in the literatures on education and youth socialization. Sense of IPE, more than EPE, is acquired with political knowledge and skills gained through political learning experiences. Yet a sense of EPE, and to a lesser extent IPE, is developed with participatory opportunities, and when achieving political goals (Dauer et al., 2021; Levy, 2013). Young individuals are thus less likely to feel that citizens' voices can be heard before experiencing any active participation opportunities or achieving any actual political goals (Levy, 2013).

Turning to political trust, findings from the experiment in the classroom indicated that the appeal of 35 policy-related VAA statements in the classroom does not in and of itself contribute to boosting pre-voters' political trust. VAA statements exposure does not affect pre-voters' political trust (see Chapter Four above). Nonetheless, VAA advice exposure has a positive influence on pre-voters' political trust. These findings corroborate Hypothesis 6: "VAA advice exposure has a positive impact on pre-voters' political trust" (H6 supported). Hence, it is likely that the personalized "profile" results page leads young users to positively appraise political institutions. It appears that the VAA outcome delivers the message to users that political institutions, and more particularly political parties, are to some extent aligned with their concerns, their sense of opinion matching with institutions being critical to the development of political trust. Furthermore, our findings show that the *Test électoral éducatif* does succeed in enhancing pre-voters' political trust, even one month after the intervention. Nevertheless, we should once again note that causal inference is less clear regarding the last DV, as measurements for political trust were not taken immediately after intervention but only about one month later (see Section 3.3.1 in Chapter Three for discussion).

Our findings confirm that the VAA output allows users to discover and evaluate their proximity with political parties. In turn, they are most likely able to assess the quality of representation of the political actors, and to appraise their satisfaction with political institutions. Our research hence is in line with Craig (1990) and Mayne & Hakhverdian's (2017) research

findings: A sense of proximity between citizens and their representatives enhance satisfaction with institutions. Citizens readily grant legitimacy to political parties, politicians, or elected representatives, as they perceive that they satisfy people's interests. With a better understanding of the political landscape, citizens are willing to trust political institutions to take political action on their behalf. That being said, our findings do not corroborate the detrimental effect assumption, according to which improved political knowledge could lead to viewing political institutions critically, and in turn to a deteriorated sense of political trust (see for instance Hooghe & Zmerli, 2011).

In addition, we seek to examine the extent to which VAA advice exposure helps to reduce disparities based on SES in pre-voters' IPE, EPE, and political trust. We do not find a significant differentiated advice effect on any DV across low- and high-SES pre-voters. All in all, these findings suggest new answers to our last research question: "To what extent is there a difference in effect based on SES?". We did not see that low- and high-SES pre-voters are affected differently by the "VAA advice". In the general conclusion chapter of the present thesis, we present some recommendations for improving the design of VAAs, with the aim of increasing the tool's impact on pre-voters (see Section 7.4.1 in Chapter Seven).

Chapter Six: The VAA Match Effect on Pre-Voters

6.1. Introduction

We pursue our study breaking open the black box of VAA effect by investigating the match effect. The present chapter further investigates the lead research question of this study: "To what extent does a VAA have an impact on pre-voters' political efficacy and trust?" (RQ1). The third VAA effect, i.e., the match effect, stems from matching the advice with the user's prior party preferences. As the users process the VAA output, they put their personalized voting advice in perspective, and apply it to their pre-existing political knowledge and party preferences (see also Figure 4, "Typology of VAA Information and Effects" in Chapter Two). In that sense, as statement and advice exposure constitute external cues in one's informational environment, the match effect also takes one's internal cues about party preferences into account.

Theoretical framework-wise, the match effect is the most intricate VAA effect. However, the methods used to investigate and analyze the match effect are less sophisticated compared to the other two VAA effects. Voting advice rendered by the VAA has not been manipulated. As a result, and contrary to the two previous empirical chapters investigating the statement and advice effects, the investigation of the match effect hypotheses relies on observational data among the subsample of VAA users. Our findings are based on genuine VAA advice users received as a result of their genuine opinions, and their answers on the 35 VAA statements. We identify three different types of advice that users may be exposed to: incongruent, congruent, and activating advice. We examine whether receiving advice that (dis)confirms initial preferences, or that activates new cognitions, affects pre-voters' political efficacy and trust. We developed our research hypotheses in Section 2.5.3 in Chapter Two.

We inspect the sense of political efficacy and trust of those who encounter VAA advice that conflicts with their party preference. When the informational environment conflicts with the previously held attitudes, an individual might realize that they had certain misconceptions, and in turn feel thrown off by attitude-discrepant information (Cacioppo et al., 1996; Festinger, 1957; Petty & Cacioppo, 1986). Incongruent advice might signal that one's idea on political parties was skewed, and the user might find this information disconcerting. We assume that VAA advice that goes against one's party preference might disempower pre-voters' sense of political efficacy and

trust. Incongruent advice might invalidate one's political views and competence, and trigger doubt over the effectiveness of the party system and the quality of representative democracy. Therefore, we hypothesize that incongruent advice exposure has a negative impact on pre-voters' IPE (H7a), EPE (H8a), and political trust (H9a).

On another note, regarding the influence of confirming advice, we recognize that individuals tend to take satisfaction from signals that are in line with their a priori opinions (Cacioppo et al., 1996; Taber & Lodge, 2006). We claim that receiving advice that confirms pre-existing beliefs conveys the idea that the user's party opinions were accurate. Hence, congruent advice exposure might boost the user's feeling of self-confidence about their own political views, knowledge, and competence. It is also expected that attitude-consistent information on ideological congruence with parties might reinforce one's expectations as regards the quality of representative democracy, and spills over to perception of political actors' responsiveness or political trust. We hypothesize that congruent advice exposure has a positive impact on pre-voters' IPE (H7b), EPE (H8b), and political trust (H9b).

In addition, activating advice applies to individuals who do not have an opinion about political parties before consulting a VAA. As a large number of pre-voters have no idea of their party preference, it is meaningful to examine the process at play when those pupils reason about information on their placement in the party landscape. For some inexperienced pre-voters, it may be the first time they think about their party preferences when discovering their personalized political profile. We argue that individuals with no firsthand cognition of political parties activate new cognitions as they face topic-specific signals in their informational environment (Lau & Redlawsk, 2001; Lodge & Hamill, 1986; Wood, 1982). Thereby, we assume that activating advice leads to party opinion formation, and to an understanding of the political landscape. In addition, individuals with no prior knowledge are found to be less resistant to informational influence as they cannot effectively counter-argue the message (Wood, 1982). Hence, they are found to form an opinion consistent with the message position (Kruglanski et al., 1993; Wood et al., 1985). For these users who lack knowledge, the VAA might help them realize that there is common ground between parties and citizens' concerns. Such information might convey the idea that the party system is receptive to citizens' expectations. Hence, we hypothesize that activating advice exposure has a positive impact on pre-voters' IPE (H7c), EPE (H8c), and political trust (H9).

We further investigate two other research questions. Our research adds to the body of knowledge by filling two other gaps in research addressing VAAs' lasting impact, as well as the tools' influence on political inequalities. We expect to find a medium-term effect of VAA in a

classroom setting (i.e., about one month after VAA intervention). We assume that it may take time, consideration, support from teachers, or maturation for pre-voters' attitudes for advice exposure to create a lasting influence (see Section 2.5.4, "The Medium-Term Effects" in Chapter Two). Therefore, we ask: "To what extent does a VAA have a lasting impact on pre-voters' political efficacy and trust?" (RQ2). Finally, we examine whether VAAs succeed in addressing the inequalities in political efficacy and trust based on individuals' socio-economic backgrounds. We acknowledge that youth from socially disadvantaged backgrounds are more likely to be the least knowledgeable about politics, and to have little sense of the efficacy of or trust toward political institutions. As a political learning activity, VAAs must stimulate the sense of efficacy and trust of all users, not only those from privileged social categories, in order to level inequalities. Hence, we ask: "To what extent is there a difference in VAA effect based on SES?" (RQ3).

6.2. Analyses and Results

Regarding the VAA match effect, advice congruence, or the measure of disconfirming/confirming/activating advice from the VAA, we look at individuals' initial party preference (measured in Wave 1) compared to the advice given by the VAA (measured in Wave 2). We thoroughly developed the methodology to measure advice congruence in Section 3.3.4 in Chapter Three. The categorical variable for "advice congruence" is equal to "incongruent advice", as the respondent ticked the "no opinion" box for the top party or initially graded the top party less than 8. The "advice congruence" variable is defined as "congruent advice" for the respondents who initially scored the first party advised as 8 or higher on the 0–10 preference scale at Wave 1. Participants who, at pre-intervention, do not give an opinion on the top party recommended by the VAA advice, are attributed to the category "activating advice". This three-category variable, therefore, expresses the extent to which the actual VAA advice matches the user's prior party beliefs (if they have a party opinion) by (dis)confirming their party preferences.

Table 8 in Chapter Three above displays the average score of reported answers for participants exposed to incongruent, congruent, or activating advice. The final subsample of the present observational study is composed of the 92 VAA users who participated in all three waves. 47.7% of them received incongruent advice, 17.4% received congruent advice, and 36.9% – namely, users who do not have initial party preference on the first advice party – were exposed to activating advice (see Figure 10 in Chapter Three). Among those, only 63 reported baseline political trust. It is found that VAA users who do not have initial party opinions are characterized by lower IPE and

political trust (see Table 8 in Chapter Three). Yet, participants do not differ in terms of EPE in Wave 1. Hence, to draw conclusions on the match effect, we will also consider respondents' initial DV level in our analyses. We also find significant differences in terms of political discussion and interest. Unsurprisingly, pre-voters who receive activating advice have fewer political discussion opportunities than those who get congruent advice (see Table 9 in Chapter Three). In addition, users who receive congruent advice are more politically interested than those who get activating or incongruent advice (see also Section 3.5 in Chapter Three).

Our methodological choices are limited by the available variables in our dataset, which comprises a rather limited number of observations. In contrast to the investigation of the statement and advice hypotheses, we do not consider multivariate analysis models with control variables for these differences between groups, due to the very small size of the subsample of VAA users (*N* incongruent advice = 42, *N* congruent advice = 16, *N* activating advice = 34). Hence, when we interpret the research results, we must bear in mind that pupils who receive an activating advice group are characterized by lower political sophistication on average, compared to those who receive incongruent or congruent advice. We also perform robustness tests using alternative measures for advice congruence, i.e., congruence (7–10), (6–10), and Top 3 (8–10) (see Section 3.3.4 in Chapter Three for discussion of the match effect measurements).

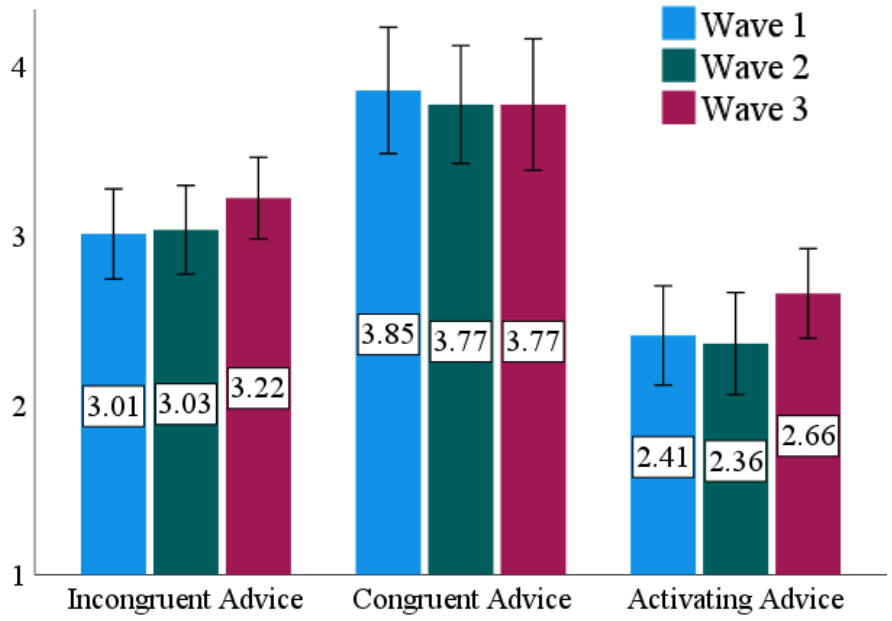
6.2.1. Descriptive Within-Group Analysis

As a first analysis step, we provide descriptive statistics for repeated measurements of each DV across time. To detect match effect on pre-voters' IPE, EPE, and political trust, we first examine group differences across time for each DV. In Chapter Three (Research Methods & Experimental Design), we reviewed the construction of the indexes for each DV. Error bar graphs allow us to visually inspect within- and between-group values on the DV indexes across time. These figures also display standard error for each mean score to assess the significance of between-group differences.

First, we explore trends in IPE. Figure 17 displays mean scores and standard errors for "incongruent advice", "congruent advice", and "activating advice" groups over time. Strikingly, we can see three distinct blocks in the figure below. The 34 pre-voters who received activating advice tend to show lower baseline IPE scores (*M* Wave 1 = 2.41, *SD* = .85) than the 42 participants who received incongruent advice (*M* = 3.01, *SD* = .84), who also show lower scores than the 16 pre-voters who received congruent advice (*M* = 3.85, *SD* = .70). This result is in line with the

descriptive statistics discussed in Table 8 in the methods chapter; we find substantial differences in IPE across the three groups at pre-intervention. As error bars across study waves greatly overlap within all three groups, these first graphical indications demonstrate that it is very unlikely to find a match effect on IPE.

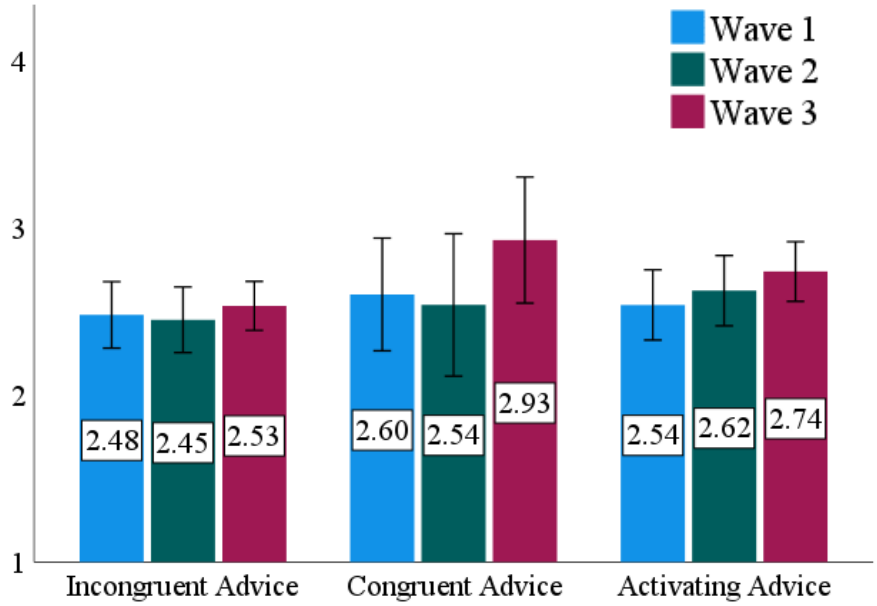
Figure 17. IPE per Type of Advice: Error Bar Graphs



Notes: Colored bars represent mean scores. Error bars illustrate the standard error for each mean score. *N* Incongruent = 42, *N* Congruent = 16, *N* Activating = 34.

Turning to EPE, Figure 18 below displays mean scores and standard errors for the three groups over time. Descriptive statistics discussed in Chapter Three revealed no significant differences between groups at pre-intervention. On average, VAA users show lower EPE than IPE (Total Mean score for EPE = 2.52, *SD* = .62, Total Mean score for IPE = 2.93, *SD* = .96; see Table 8 in Chapter Three). The sense of EPE of those exposed to incongruent advice does not seem to change across time. Yet, the 34 pre-voters exposed to activating advice experience slight but steady growth in EPE across the study waves. Pre-voters exposed to congruent advice seem to experience an upsurge in EPE at the end of the study (*M* = 2.93, *SD* = .71). We must interpret these first findings carefully, as all error bars overlap. We further analyze between-group differences in the next section.

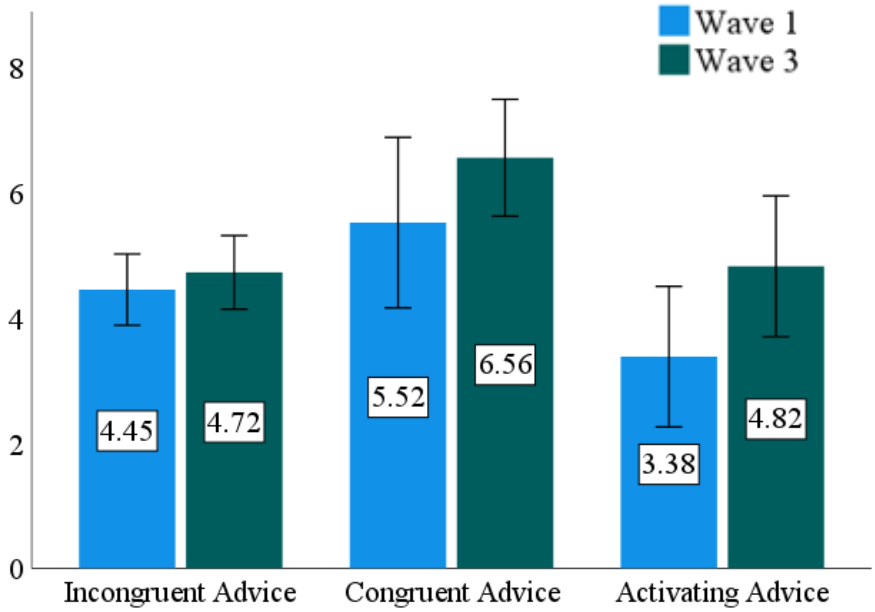
Figure 18. EPE per Type of Advice: Error Bar Graphs



Notes: Colored bars represent mean scores. Error bars illustrate the standard error for each mean score. *N* Incongruent = 42, *N* Congruent = 16, *N* Activating = 34.

As we turn to political trust, Figure 19 displays Wave 1 and Wave 3 mean scores and standard errors for the three types of VAA advice. Table 8 in Chapter Three indicates that there are significant differences in baseline political trust between groups. Figure 19 below documents that the 29 pre-voters exposed to incongruent advice show a mean trust score of 4.45 in Wave 1 (*SD* = 1.50) and 4.72 in Wave 3 (*SD* = 1.55). The nine pre-voters exposed to congruent advice show the highest initial average trust score in Wave 1 (*M* = 5.52, *SD* = 1.77), and the highest in Wave 3 (*M* = 6.56, *SD* = 1.21). The 15 pre-voters exposed to activating advice show the lowest initial political trust score (*M* = 3.38, *SD* = 2.03). They seem to experience the greatest change in political trust, as at the end of the study, they show a mean trust score of 4.82 (*SD* = 2.03). These first graphic indications suggest that there might be a positive effect of congruent and activating advice exposure on political trust. We proceed to further inferential analyses in order to draw conclusions on the DVs trends we just pinpointed (see Section 6.2.2 below).

Figure 19. Political Trust per Type of Advice: Error Bar Graphs



Notes: Colored bars represent mean scores. Error bars illustrate the standard error for each mean score. *N* Incongruent = 29, *N* Congruent = 9, *N* Activating = 15.

6.1.1. Bivariate Within-Group Analysis

As a second analysis step, we turn to bivariate within-group analysis in order to draw conclusions regarding the match effect on our three DVs. As we find differences in the initial levels of DVs across groups, we proceed to bivariate within-group analysis to account for these baseline variations. Descriptive statistics displayed in Table 8 in Chapter Three also revealed significant between-group differences in terms of political discussion and interest. Yet, we cannot proceed to multivariate analyses to control for between-group imbalances, as we did for the statement and advice effects (see Chapters Four and Five), due to the small size of the subsample of VAA users.

Therefore, regarding both internal and external political efficacy variables, within-group ANOVA allows for examining the evolution of DVs over time for each group. These tests allow for contrasting changes in average DV score over time (i.e., between Wave 1 and Wave 2, and between Wave 1 and Wave 3). Yet, within-group ANOVA tests displayed in Tables 18 and 19 below reveal no significant change over time in IPE or EPE as Levene's test is not significant for any of the groups. This is further confirmed by robustness tests displayed in Tables A.17 to A.26 in the appendix (*t*-tests for match effect using all participants from Wave 1 and Wave 2, and within-group ANOVA using alternative measures of advice congruence). These findings do not support any of our hypotheses regarding the match effect on IPE and EPE: There is no simple correlation of activating, incongruent, or congruent advice exposure with political efficacy (H7 and H8 not corroborated). This is true both in the short and medium run. Yet, one might wonder whether

there is significant differentiated activating, incongruent, or congruent advice exposure impact based on pre-voters' SES. We explore our last research question in Section 6.2.3 below.

Table 18. Match Effect: Within-Group ANOVA for IPE

	df1	*df2*	Sum Sq	Mean Sq	*F*	*p*
Incongruent	2	39	1.256	.628	.956	.387
Congruent	2	13	.030	.015	.031	.970
Activating	2	31	1.759	.879	1.266	.286

Notes: Sum Sq = Sum of Squares; Mean Sq = Mean Square.

Table 19. Match Effect: Within-Group ANOVA for EPE

	df1	*df2*	Sum Sq	Mean Sq	*F*	*p*
Incongruent	2	39	.099	.050	.151	.860
Congruent	2	13	1.479	.740	1.479	.238
Activating	2	31	.705	.352	1.039	.357

Notes: Sum Sq = Sum of Squares; Mean Sq = Mean Square.

Lastly, we turn to bivariate within-group analysis for political trust. As this DV was measured at two time-points only, we proceed to *t*-tests for political trust measured in Wave 1 and Wave 3. For each type of VAA advice, we test the significance of Wave 1 to Wave 3 political trust change. Results are displayed in Table 20 below.

First, we look at the *t*-test conducted to determine if there is a significant difference between Wave 1 political trust and Wave 3 political trust among pre-voters exposed to incongruent advice. Regarding pre-voters exposed to incongruent advice, we do not find any significant change in political trust ($t(28) = 1.140$, $p = .264$). Contrary to what was hypothesized, when they are exposed to VAA advice incongruent to their initial preferences, pre-voters do not put their sense of trust in the political institutions in question. In addition, Table A.36 in the appendix shows *t*-tests analysis results using alternative measures for advice congruence. All robustness tests displayed in Table A.36 corroborate this finding. We must discard hypothesis 9a: Incongruent advice exposure is not negatively associated with pre-voters' political trust (Hypothesis 9a not supported).

Table 20. *T*-tests for Match Effect on Political Trust

	Trust Wave 1			**Trust Wave 3**					
Variable	*M*	*SD*	*N*	*M*	*SD*	*N*	*df*	*t*	*p*
Incongruent	4.45	1.50	29	4.72	1.55	29	28	1.140	.264
Congruent	5.52	1.77	9	6.56	1.21	9	8	2.972*	.018
Activating	3.38	2.03	15	4.82	2.03	15	14	2.833*	.013

Note: Statistical significance: * p-value ≤ 0.05.

Second, pupils exposed to congruent advice initially show an average score of 5.52 on the index of political trust (SD = 1.77, N = 9). At the end of the study, their sense of political trust has risen to 6.56 (SD = 1.21, N = 9). Table 20 above reveals that pre-voters exposed to congruent advice show a statistically significant change in political trust at the end of the study ($t(8) = 2.972$, $p = .018$, Cohen's $d = .991$). The Cohen's d value of .991 indicates a large congruent advice effect on political trust. All in all, we find that congruent advice exposure leads to a 9.45% improvement on the 0–10 scale. Congruent advice contributes to strengthening pre-voters' political trust. All robustness tests displayed in Table A.36 corroborate the statistical evidence. We see a statistically significant and positive average change in political trust over time for pre-voters exposed to congruent advice. We can confirm Hypothesis 9b: Congruent advice exposure is positively associated with pre-voters' political trust (H9b supported).

Lastly, t-tests displayed in Table 20 above confirm that there is a significant change in trust for the 15 pre-voters exposed to activating advice ($t(14) = 2.833$, $p = .013$, Cohen's $d = .731$). The Cohen's d value of .731 indicates a medium size of activating advice effect on political trust. Pre-voters exposed to activating advice experience a significant rise in political trust and show an average score of 4.82 on the 0–10 scale at the end of the study. We find an average improvement of 13.09% in political trust among pupils exposed to activating advice. All robustness tests displayed in Table A.36 also confirm that pre-voters exposed to activating advice experience an improved sense of political trust at the end of the study. We must confirm Hypothesis 9c: Activating advice exposure is positively associated with pre-voters' political trust (H9c supported).

The findings we just discussed also bring evidence to answer our second research question on the lasting effect of VAA. Regarding the match effect, we do not observe any short- or medium-run match effect on any of the two dimensions of political efficacy. Nevertheless, the findings suggest a medium-run match effect on political trust. Activating and congruent advice exposure both lead to higher political trust with a magnitude of, respectively, 9.45% and 13.09%. While current VAA research overlooked the match effect on political trust and, more generally, political attitudes, our findings demonstrate that the match effect has a substantial influence. We do not find any damaging (nor improving) effect of incongruent advice on political trust, as set out in Hypothesis 9b. On another plan, a differentiated impact of activating, incongruent, or congruent exposure on our DV may be expected, based on participants' SES. In Chapter Two, we developed our last research question regarding the extent of the difference in the VAA effect based on SES. The following section presents analysis results and discussion regarding this last research question.

6.2.2. Differences Based on SES

As a last step, to provide answer elements for our last research question, we investigate the influence of pre-voters' SES on the match effect. The last research question we are raising is: "To what extent is there a difference in VAA effect based on SES?" (RQ3). We use mother's educational attainment as a proxy for pre-voters' SES (see Section 3.3.5 in Chapter Three for discussion regarding the methodological approach). To do so, we proceed to bivariate between-group analysis. We cannot proceed to multivariate analyses that include control variables due to low statistical power. The size of the subsamples of low- and high-SES VAA users is very small. We further discussed this issue in Section 3.4 of Chapter Three. We assess the match effect among low- and high-SES pre-voters. For each type of advice, we provide *t*-test analyses for DV changes over time between low- and high-SES pre-voters to assess the differentiated match effects. We put the SES impact on the match effect into perspective by comparing low- and high-SES pre-voters' change in IPE, EPE, and political trust over time (i.e., between Wave 1 and Wave 2, and between Wave 1 and Wave 3). We also provide robustness tests in the appendix displaying *t*-tests using the sample of all participants who took part in Wave 1 and Wave 2, and the three alternative measurements of advice congruence.

First, we inspect SES influence on the match effect for IPE. *T*-tests displayed in Table 21 below reveal no statistically significant difference in match effect between low- and high-SES pre-voters. Robustness tests displayed in Tables A.28 to A.31 in the appendix confirm this finding.[14] All in all, low- and high-SES pre-voters show comparable progress between the beginning and end of the study, whether they are exposed to incongruent ($t(40) = -.571$, $p = .767$), congruent ($t(14) = -.149$, $p = .883$), or activating advice ($t(32) = .798$, $p = .431$). We find no differentiated match effect on IPE.

[14] Table A.28 in the appendix displays *t*-test analyses for short-run IPE changes between low- and high-SES pre-voters using the sample of all participants who partook in Wave 1 and Wave 2. These robustness checks support the findings with greater statistical power facilitated by larger sample sizes, degrees of freedom and approximately similar variances across pairs of samples.

Table 21. *T*-tests Match Effect on IPE by SES

	Low SES			High SES					
Variable	*M*	*SD*	*N*	*M*	*SD*	*N*	*df*	*t*	*p*
Incongruent									
Wave 1 to Wave 2	.15	.57	18	-14	.55	24	40[1]	-1.648	.107
Wave 1 to Wave 3	.20	.57	18	.25	.52	24	40[1]	-.571	.767
Congruent									
Wave 1 to Wave 2	-.33	.53	5	.09	.81	11	14[1]	-.913	.378
Wave 1 to Wave 3	-.13	.77	5	-.06	.95	11	14[1]	-.149	.883
Activating									
Wave 1 to Wave 2	-.10	.65	14	-.02	.80	20	22[1]	-.305	.763
Wave 1 to Wave 3	.38	.74	14	.15	.89	20	22[1]	.798	.431

Notes: [1]Assuming equal variance. Statistical significance: *** p-value ≤ 0.001 • ** p-value ≤ 0.01 • * p-value ≤ 0.05.

All things considered, we do not find any match effect on IPE. The assumptions made from the literature cannot be corroborated. Incongruent advice does not seem to involve cognitive dissonance that disempowers young users, neither does congruent advice seem to boost pre-voters' confidence in their ability to understand politics (see for instance Taber & Lodge, 2006). Nor can we corroborate that voting advice activates new cognitions on political parties that would lead to the formation of party opinion and an understanding of the political landscape (see for instance Wood, 1982; Wood et al., 1985).

Second, we turn to the differentiated match effect on EPE. *T*-tests displayed in Table 22 below and robustness tests in Tables A.22 to A.26 in the appendix indicate that low-SES and high-SES pre-voters' trends in EPE progress do not significantly differ from each other. We do not see any differentiated effect of incongruent advice exposure on EPE based on SES.

Table 22. *T*-tests for Match Effect on EPE by SES

	Low SES			High SES					
Variable	*M*	*SD*	*N*	*M*	*SD*	*N*	*df*	*t*	*p*
Incongruent									
Wave 1 to Wave 2	.05	.58	18	-.08	.73	24	40[1]	.666	.509
Wave 1 to Wave 3	.07	.59	18	.00	.52	24	40[1]	.419	.678
Congruent									
Wave 1 to Wave 2	.24	.52	5	-.29	.39	11	14[1]	2.033[+]	.063
Wave 1 to Wave 3	.12	.50	5	.37	.45	11	14[1]	-.964	.351
Activating									
Wave 1 to Wave 2	.00	.79	14	.17	.54	20	22[1]	-.748	.460
Wave 1 to Wave 3	.35	.83	14	.14	.52	20	22[1]	.881	.385

Notes: [1]Assuming equal variance. Statistical significance: *** p-value ≤ 0.001 • ** p-value ≤ 0.01 • * p-value ≤ 0.05.

Regarding congruent advice exposure, we observe yet another trend of EPE change based on SES. Among the 16 participants who received congruent advice, only five of them come from an underprivileged socio-economic background. Due to the very small size of the subsample of low-SES pre-voters exposed to congruent advice using the "congruence (8–10)" measure, we must be cautious with the findings of the *t*-tests illustrated in Table 22 above, and turn to the robustness tests displayed in Tables A.32 to A.35 in the appendix to assess the differentiated effects of congruent advice. Therefore, the *t*-tests illustrated in Table 22 reveal that low-SES pre-voters tend to experience a positive immediate impact of congruent advice exposure (M = .24, SD = .52), and high-SES pre-voters rather show negative EPE change in the short run (M = -.29, SD = .39, $t(14)$ = 2.033, p = .063, Cohen's d = 1.113). Only one robustness test out of the three confirms the statistical significance of this finding, yet the two other robustness tests confirm the substantive significance of the differentiated effect of congruent advice exposure on EPE.[15]

The findings discussed in the previous sections indicate no simple match effect on EPE, but the present section brings evidence of match effect depending on one's SES. All in all, we observe differentiated trends of congruent advice impact on EPE across low- and high-SES pre-voters. Low-SES pre-voters benefit from the positive impact of congruent advice in the short run, while high-SES pre-voters tend to show a deteriorated sense of political trust in the short run. Yet, there is no significant difference between low- and high-SES pre-voters in the medium run ($t(14)$ = -.964, p = .351).

Regarding pre-voters exposed to activating advice, there is no evidence of a significant difference in EPE change between low- and high-SES pre-voters, nor in the short ($t(32)$ = -748, p = .460) and medium run ($t(32)$ = .881, p = .385). We cannot state that there is a differentiated effect of activating advice exposure across low- and high-SES pre-voters.

Lastly, we observe political trust change between Wave 1 and Wave 3 across SES groups. The *t*-test results are displayed in Table 23 below. We find no significant differentiated effect of incongruent or congruent advice exposure across low- and high-SES pre-voters. Although we find a simple positive effect of congruent advice exposure on political trust (see Section 6.2.2 above), there is no evidence of differences in effect based on SES. We find a large difference in trust change between low- and high-SES participants who receive activating advice ($t(9.084)$ = -2.077, p = .067,

[15] T-tests for "congruence 7–10" (t(30) = 1.510, p = .142) and "congruence 6–10" (t(36) = 1.010, p = .320) illustrated in Tables A.32 and A.35 do not confirm the statistical significance of the differentiated immediate impact of congruent advice. Yet, t-tests for "congruence top 3" also indicate that low-SES pre-voters make positive gains from congruent advice exposure, compared to high-SES participants (t(48) = -1.739, p = .089, Cohen's d = .515).

Cohen's d = .900). At the end of the study, the 10 high-SES participants exposed to activating advice achieve striking progress in political trust (Mean change = 2.04, SD = 2.33) with a final score of 5.46 on the 0–10 scale. The five low-SES participants' sense of political trust stagnates over time. Robustness testing using an alternative measure of advice congruence also corroborates that there is a positive activating advice effect on political trust among high-SES pre-voters, while low-SES pre-voters do not seem to experience an increase in their sense of political trust through the study waves.

Table 23. *T*-tests for Match Effect on Political Trust by SES

	Low SES			**High SES**					
Variable	*M*	*SD*	*N*	*M*	*SD*	*N*	*df*	*t*	*p*
Incongruent									
Wave 1 to Wave 3	.13	1.55	10	.13	1.28	19	27[1]	.092	.928
Congruent									
Wave 1 to Wave 3	1.91	1.65	4	.79	.89	5	7[1]	1.191	.351
Activating									
Wave 1 to Wave 3	.27	.50	5	2.04	2.33	10	9.084	-2.077^{+}	.067

Notes: [1]Assuming equal variance. Statistical significance: *** p-value ≤ 0.001 • ** p-value ≤ 0.01 • * p-value ≤ 0.05 • $^{+}$ p-value ≤ 0.10.

Overall, the findings provide insight into the various trends in the differentiated match effect across the three different types of advice. In the following section, we put the findings on match effect differences based on SES with the findings on simple match effect discussed in the previous sections. In so doing, we answer the research questions and hypotheses that have been raised on match effect.

6.3. Discussion

Our study makes it possible to explore the various kinds of VAA effects on pre-voters' political efficacy and trust. In the present chapter, we investigated the hypotheses regarding the VAA match effect on our the DVs, namely, internal and external political efficacy, and political trust. We expected to find a negative effect of incongruent advice exposure, and a positive effect of congruent and activating advice. In addition, we investigated our two research questions on VAA effects in the medium run, and the differentiated effects across SES. We present a summary of the hypothesis testing in Table 24 below. Despite the small sample size inherent to our observational study among VAA users only, our field study brought meaningful evidence regarding the match effect on pre-voters' political attitudes. In the present section, we discuss our key research findings regarding the VAA match effect on pre-voters.

First, it must be noted that we did not find any significant match effect on IPE. None of our hypotheses on incongruent (H7a), congruent (H7b), and activating advice (H7c) effect are supported. As Chapter Four revealed that VAA statements play a role in the development of pre-voters' IPE, and Chapter Five demonstrated that VAA advice first prompts pre-voters to question their sense of IPE and then restores their baseline level of IPE, this chapter's findings showed that the type of advice one is exposed to does not affect one's IPE. While findings from previous empirical chapters revealed that VAAs do influence pre-voters' IPE, we cannot conclude that the match effect matters for shaping pre-voters' sense of IPE.

Table 24. Summary of Hypothesis Testing on Match Effect

Hypothesis	Hypothesized effect	Results	Effect Found
IPE			
H7a	Incongruent advice exposure has a negative impact on pre-voters' internal political efficacy	Not supported	0
H7b	Congruent advice exposure has a positive impact on pre-voters' internal political efficacy	Not supported	0
H7c	Activating advice exposure has a positive impact on pre-voters' internal political efficacy	Not supported	0
EPE			
H8a	Incongruent advice exposure has a negative impact on pre-voters' external political efficacy	Not supported	0
H8b	**Congruent advice exposure has a positive impact on pre-voters' external political efficacy**	**Supported**	**+**
H8c	Activating advice exposure has a positive impact on pre-voters' external political efficacy	Not supported	0
Pol. Trust			
H9a	Incongruent advice exposure has a negative impact on pre-voters' political trust	Not supported	0
H9b	**Congruent advice exposure has a positive impact on pre-voters' political trust**	**Supported**	**+**
H9c	**Activating advice exposure has a positive impact on pre-voters' political trust**	**Supported**	**+**

Note: Author's own elaboration. Reported effect tendencies indicate positive (+) or null effects (0). No negative effect was found.

On another note, our study contributes to our understanding of incongruent advice impact on VAA users. We started from the premise that receiving disconfirming advice tells users that the preferred party is an incongruent choice. We assumed that VAA advice that goes against one's party preference might disempower pre-voters' sense of political efficacy and trust. Incongruent advice might invalidate one's political views and competence, and trigger doubt on the effectiveness of the party system and on the quality of representative democracy. Therefore, we hypothesized that incongruent advice exposure has a negative impact on pre-voters' IPE (H7a), EPE (H8a), and political trust (H9a). The findings did not reveal any simple or differentiated, nor short or medium-

term effect of incongruent advice. We must refute all our hypotheses on the incongruent advice exposure effect. Incongruent advice exposure does not have a negative impact on pre-voters' political efficacy and trust (Hypotheses 7b, 8b, and 9b not supported). Incongruent advice does not lead users to revise their partisan views and expectations as regards the quality of representative democracy, and does not mitigate their sense of political efficacy and trust. As our study brings no results regarding incongruent advice impact, this might be evidence that users discard incongruent information. Social psychology research indeed has demonstrated that individuals tend to disregard information that triggers cognitive dissonance (see Section 2.4.2 in Chapter Two for further discussion).

In addition, we discuss findings regarding the congruent advice effect on pre-voters' sense of political efficacy and trust. We started from the premise that receiving advice confirming pre-existing beliefs conveys the idea that the user's party opinions were accurate. Hence, congruent advice exposure might boost the user's feeling of self-confidence about their own political views, knowledge, and competence. It was also expected that attitude-consistent information on ideological congruence with parties might reinforce one's expectations as regards the quality of representative democracy, and spill over to perception of political actors' responsiveness or political trust. We hypothesized that congruent advice exposure has a positive impact on pre-voters' IPE (H7b), EPE (H8b), and political trust (H9b). All this notwithstanding, the findings reveal a diverse range of congruent advice effect mechanisms for each DV. We do not find any simple or differentiated effect of congruent advice exposure on IPE. We cannot confirm our hypothesis on the congruent advice effect on pre-voters' IPE (H7b not supported).

Regarding EPE, we did not find any simple, yet did find a large differentiated effect of congruent advice exposure. While low-SES pre-voters show positive progress in EPE in the short run, high-SES pre-voters experience positive progress in the medium run. Ultimately, both SES groups show a comparable range of progress in EPE between the beginning and end of the study. We can confirm that congruent advice exposure has a positive impact on pre-voters' EPE (H8b supported). Conversely, regarding political trust, we found a large simple yet not differentiated effect of congruent advice exposure. We can confirm that congruent advice exposure has a positive impact on pre-voters' political trust (H9b supported). All in all, when VAA users receive voting advice that matches their initial preferences as a result of their policy opinions being confronted with those of the party, they come to realize that they can find a congruence between their own concerns and those of political parties. Such confirming information hence boosts pre-voters' perception that the representative system is responsive and worth trusting.

The last type of advice, i.e., activating advice, applies to individuals with no prior party opinions. For such individuals, being faced with a "political mirror" that reflects their party matching activates cognitions of partisanship. We therefore assume that activating advice leads to the formation of party opinion and understanding of the political landscape. Hence, we hypothesized that activating advice exposure has a positive impact on pre-voters' IPE (H7c), EPE (H8c), and political trust (H9c). Yet, no effect of activating advice exposure is found on IPE (H7c not supported), nor on EPE (H8c not supported). In this sense, we can say that the activation of thinking is not a strong enough stimulus to boost one's sense of ability to understand and engage in politics.

We find a positive effect of activating advice exposure on political trust. In addition, pre-voters from a privileged background are found to benefit more from activating advice. We can confirm that activating advice exposure has a positive impact on pre-voters' political trust (H9a supported). In this sense, we can say that the activation of thinking contributes to boosting the political trust of all, but high-SES pre-voters' sense of political trust benefits more from activating advice compared to low-SES pre-voters. These results broaden our understanding of political trust development. VAA advice allows unknowledgeable users to find common ground between parties and citizens' concerns. Therefore, as far as pre-voters with no prior party opinions are concerned, the idea that the party system is receptive to citizens' expectations is conveyed by VAA advice, and even more so among those from a privileged background. However, research acknowledges that citizens who have a comfortable SES are those who tend to express a positive feeling toward public authorities and grant legitimacy to the political system, as they tend to be successful in social, economic, and political life (Catterberg & Moreno, 2005; Zmerli & Newton, 2011, see also Section 2.2.2 in Chapter Two).

Taken together, our research findings on the VAA match effects reflect complex and mixed VAA effect dynamics. This also highlights that the one-dimensional characterization of VAA effects that is prevalent in current VAA research is less than comprehensive. In Chapter Seven, we provide a pooled analysis and discussion of our main research findings on the statement, advice, and match effects to draw final conclusions about our research questions on VAA effects. In addition, we provide new insights into ways to improve VAA design for education purposes.

Chapter Seven: Conclusion

7.1. Introduction

This research focused on disambiguating the various kinds of VAA effects on pre-voters' sense of political efficacy and trust. We aimed to identify what makes a difference in the design of a VAA in influencing users' political attitudes: whether the simple act of browsing VAA statements and reflecting upon policy issues contributes to fostering political efficacy and trust (the statement effect hypothesis), whether having a personalized political mirror put in front of oneself improves a user's political efficacy and trust (the advice effect hypothesis), and whether matching the VAA output with the user's prior party preferences adds value in building one's political efficacy and trust (the match effect hypothesis). In addition, we investigated whether these effects persist one month after VAA intervention, and whether VAAs succeed in narrowing disparities in political efficacy and trust based on SES.

In the empirical part of the present thesis, we sought to answer the following question: **To what extent does a VAA have an impact on pre-voters' political efficacy and trust? (RQ1).** Additionally, we wanted to know about the VAA's effects in the medium run, and its ability to mitigate inequalities in political resources that are influenced by an individual's socioeconomic status. To that end, we asked the following two sub-questions: **To what extent does a VAA have a lasting impact on pre-voters' political efficacy and trust? (RQ2) and To what extent is there a difference in VAA effect based on SES? (RQ3).** We present a summary of hypothesis testing on both short-run and medium-run effects for each DV in Table 25 below.

As regards statement effect, the results only showed (see Chapter Four, H1 to H3) a significant positive effect on IPE. Turning to the second kind of effect (see Chapter Five, H4 to H6), we found a negative effect of advice exposure on IPE in the short run. In addition, we found a positive advice effect on political trust. As regards match effect (see Chapter Six, H7 to H9), we did not find any significant incongruent advice effect. We found positive congruent advice on EPE in the short run, and on political trust in the medium run. Lastly, we also found evidence of activating advice effect on political trust. In the following section, we look further into the key findings of this study.

Table 25. Summary of Hypothesis Testing

Hypothesis	Hypothesized effect		IPE	EPE	Trust
Statement effect					
H1–H3	VAA statement exposure has a positive impact on pre-voters' political attitudes	Short run	+	0	/
		Medium run	+	0	0
		Low SES	0	0	0
Advice effect					
H4–H6	VAA advice exposure has a positive impact on pre-voters' political attitudes	Short run	-	0	/
		Medium run	0	0	+
		Low SES	0	0	0
Match effect					
H7a–H9a	Incongruent advice exposure has a negative impact on pre-voters' political attitudes	Short run	0	0	/
		Medium run	0	0	0
		Low SES	0	0	0
H7b–H9b	Congruent advice exposure has a positive impact on pre-voters' political attitudes	Short run	0	+	/
		Medium run	0	0	+
		Low SES	0	+	0
H7c–H9c	Activating advice exposure has a positive impact on pre-voters' political attitudes	Short run	0	0	/
		Medium run	0	0	+
		Low SES	0	0	0

Notes: Reported effect tendencies indicate positive (+), negative (-), or null effects (0). There is no data (/) as regards short-run effects on political trust.

7.2. Main Findings

To start with, we recognize that the present study yielded modest results in terms of validation of the research hypotheses. It is striking to see in Table 25 that most stated hypotheses were not corroborated. Further research is needed to overcome the shortcomings of our study (see also Section 7.3 below). It must be noted that the present study used a solid experimental design, and hence fostered robust findings. On the other hand, this also made it possible to provide an evidence-based depiction of the complexity of VAA effects. Our work delivers preliminary, innovative, and insightful findings for future research agendas. In what follows, we emphasize the key conclusions of the study.

Firstly, VAA statements appear to play a role within the VAA effects processes. We only observe a short-run and medium-run positive effect on IPE. However, we do not find any significant statement effects as regards EPE and political trust. Regardless, the findings demonstrate that mere exposure to VAA statements is a sufficient impetus to grow pupils' sense of IPE, both in the short and medium run. Being exposed to 35 policy statements and reflecting upon them is a meaningful endeavor to improve pre-voters' sense of IPE. Hence, in a classroom setting, this kind of information is very valuable for pre-voters' empowerment. This is evidence that VAA statements may find their place in citizenship education programs.

Second, our study emphasizes that VAA advice does have an added value in VAA effects processes. No evidence of a direct or differentiated advice effect on political efficacy is found in either the short or medium term. As regards the medium-run effects of VAA advice on political trust, our study shows that VAA use in the classroom builds up pupils' political trust, although it does not allow those who are socio-economically disadvantaged to catch up with their more advantaged peers. A VAA intervention benefits all pupils but does not reduce inequalities in terms of political trust. Overall, our results indicate that VAA use in the classroom is not a medium-long-lasting solution for developing pupils' sense of efficacy, but it is for political trust. This highlights that VAAs constitute a relevant tool to work on pre-voters' political trust. The personalized "political profile" feature of VAAs does make a difference in building up pre-voters' trust. VAA statements on policy issues do not constitute sufficient information stimulus to affect pre-voters' perception of political institutions. The results rather showed that statements on policy issues must be supplemented by political mirror information to influence pre-voters' political trust. VAAs can therefore find their place in the classroom to build pupils' trust in political institutions.

Third, one puzzling finding is that the VAA output challenges pre-voters' perception of their ability to understand politics. The results from Chapter Four revealed that pre-voters exposed to VAA advice tend to feel less IPE immediately after intervention. At the end of the study, they restored their initial level of IPE. Pre-voters first feel unsettled by VAA advice information, as they may have difficulty interpreting it on their own. Such politically inexperienced individuals might not have sufficient internal resources to comprehend political profile information. So as not to leave young VAA users on their own, we assume that time, teachers' guidance, and individual or collective learning might contribute to them bouncing back from this loss in self-efficacy. In contrast, a study by van de Pol (2016) shows a positive relationship between VAA use on Dutch voters' IPE. It is important to consider the differences in the study populations to attribute the difference in findings. While van de Pol's study focused on Dutch voters, the present study specifically examined Walloon pre-voters, a politically inexperienced population. We also recognize that the methodological differences might explain the difference in research outcomes. While van de Pol's research was an observational study, the experimental nature of the present study allows greater control over variables and thus offers a more focused investigation into specific VAA effects.

Fourth, our findings have uncovered that VAA users might tend to discard incongruent advice. What particularly stands out in Table 25 above is that we find no incongruent advice effect on any of the three DVs. While the expected finding was a negative impact of incongruent advice, it appears that this does not lead users to revise their partisan views and expectations as regards the

quality of representative democracy, and does not mitigate their sense of political efficacy and trust. As our study brings no results regarding incongruent advice impact, this might be evidence that users discard incongruent information. Social psychology research and the theory of motivated reasoning indeed have demonstrated that the more confident individuals are of their opinions, the harder it is for them to admit that they were wrong. In turn, as individuals encounter opposing views, they tend to disregard information that triggers cognitive dissonance (Cacioppo et al., 1996; Taber & Lodge, 2006; Zaller, 1992). While discarding such information may provide temporary relief from the mental discomfort of cognitive dissonance, it can reinforce existing beliefs, create a distorted view of reality, and prevent individuals from fully understanding and resolving the cognitive dissonance. Individuals should be encouraged to actively seek out information and challenge their own beliefs. We'll address this avenue for media literacy education in Section 7.4.3 below.

Fifth, the congruent advice effect was found to have had the largest impact. Yet, only a few pre-voters received congruent advice, as shown in Figure 10 in Chapter Three (17.4% of VAA users were exposed to congruent advice). The findings revealed a diverse range of congruent advice effect processes for each DV. We do not find any simple or differentiated effect of congruent advice exposure on IPE. Regarding EPE, we do not find any simple, yet a large differentiated effect of congruent advice exposure. Low-SES pre-voters show positive progress in EPE in the short run. Yet, this effect does not last in the medium run. Conversely, regarding political trust, we find a large simple effect of congruent advice exposure. In that sense, confirming information boosts pre-voters' perception that the representative system is responsive and worth trusting. These findings are also in line with the theory of motivated political reasoning. Even at a young age, citizens seem to experience a positive affective response to belief-confirming political information.

The last innovative result that emerges from our study is that "political profile" information particularly matters for pre-voters who had not yet formed any party opinions. Activating advice is particularly significant in one's development of political attitudes as it applies to those who have not acquired the internal political resources to form an opinion. Our study is the first to examine VAAs' impact on citizens who do not have party preferences. In that sense, this constitutes complex and nuanced VAA effects processes. The findings demonstrated that activating advice has a positive impact on political trust but not on political efficacy. Yet pupils with higher SES tend to make greater political trust gains from VAA activating advice exposure than low-SES pre-voters. The VAAs' drawback is that it exacerbates existing inequalities in terms of political trust among those who have no political party opinion. The way pupils cope with this output varies according to their families' socio-economic background. Therefore, as far as pre-voters with no prior party

opinions are concerned, the idea that the party system is receptive to citizens' expectations is conveyed by VAA advice, and even more so among those from a privileged background. Yet, current research acknowledges that high-SES citizens are those who tend to feel a high level of elites' responsiveness, and our research additionally demonstrates that this feeling is magnified upon receiving "political profile" information. This is all evidence that the type of advice received from the VAA is a non-negligible part of VAAs' effects processes.

All things considered, we can answer our three research questions about the impact of a VAA on pre-voters' sense of IPE, EPE, and political trust (RQ1), its impact in the medium run (RQ2), and its differentiated impact based on SES (RQ3). We can say that the VAA fosters all three attitudes in distinct ways. The VAA statements are of prime importance when it comes to building pre-voters' sense of internal political efficacy. The *Test électoral éducatif* is found to have a very limited impact with respect to the external aspect of political efficacy. Finally, it turns out that exposure to VAA advice builds young users' political trust. As low-SES pre-voters rather benefit from congruent advice exposure, high-SES pre-voters benefit from activating advice exposure. Furthermore, the positive VAA effects are found to be retained about one month after VAA use.

In that sense, the VAA is no one-size-fits-all solution for citizenship education. This short intervention does not have the power to make students euphoric about politics, but it does open the door to their empowerment. We can state that this thesis draws meaningful conclusions and has societal implications. We observe positive changes and developments even among students with few political or family background resources. VAAs do contribute to building up young citizens' political efficacy and trust amidst the intricate political socialization processes. In that sense, these apps can contribute to addressing the issue of citizens' disengagement and lack of faith in political institutions within representative democracies. We therefore make recommendations for the implementation of these tools among young members of the public, and discuss this further in Section 7.4. We acknowledge that the present research has provided valuable insights into the effects of VAAs on pre-voters' political attitudes; we also recognize that there are limitations to this research. We address these limitations in the following section.

7.3. Limitations & Prospects for Further Research

Before we turn to discuss the contributions of the present thesis, we articulate the limitations of the study, along with prospects for further research. The present study is the first of its kind, and can serve as a baseline for other studies; it of course has not covered the whole field

of possibilities regarding methodology or the evidence available. This thesis raises new questions linked to the theoretical and practical approaches, as well as the choice of population and case. In the present section, we acknowledge the main limitations of the present study and potential areas for future research.

First, this study was marked by the COVID-19 crisis. The data collection was delayed because of school closures, and literature acknowledges that citizens' political attitudes were affected by this major event. Belgian young people were found to experience mental distress during the pandemic (Rens et al., 2021), and the general population of adults has shown eroding support for the government (Massart et al., 2021). In that sense, the COVID-19 crisis might have had an influence on the outcomes being measured in the study, among both the experimental and control groups. We further discuss these limitations in Section 3.2.1 from Chapter Three. We can take lessons from these hurdles to shape further research. The worldwide pandemic was a serious reminder that the political timeline and cycles are not linear. When designing a field study, especially using experimental design, researchers must bear in mind that external events might contaminate the experiment or survey research. When analyzing and interpreting research results, one must keep alive the awareness that the opinion of citizens and the political agenda are heavily influenced by crises or political events, and fluctuate accordingly. Social research cannot function in a vacuum, as one cannot simply ignore the influence of real-life events, as well as dynamic and complex social systems that are difficult to control or manipulate in a research setting. Social science research techniques are becoming more and more inspired by laboratory research procedures. Yet, findings from research led in closed and controlled environments for the sake of internal validity have only limited external validity if they are not a reflection of real-world situations.

Second, it must be acknowledged that the scope of evidence of the present research only applies to pre-voters and a classroom setting. Our research misses out on out-of-school youth, an already marginalized group. In addition, our research did not include pupils in vocational education (see Section 3.2.1 in Chapter Three for further discussion on the participants' selection strategy). Yet, one could apply a VAA intervention and test whether our findings hold outside the school context. As such a short VAA intervention is found to have a lasting impact, it could be part of larger public campaigns or repeated over a lifetime. School is not the only way to reach pre-voters, but VAAs can also be promoted on social media, accessed from home, or in booths on the grounds of music festivals as part of larger public campaigns. Such political education programs can also be targeted to other categories of pre-voters, such as the immigrant population, as they might also prepare to become novice voters. In addition, VAAs might reach greater significance with repeated exposure during the school years, or even over a lifetime and during election years. On another

note, panel-study research could also investigate longer-run VAA impacts to keep track of individuals as they reach voting age. In addition, future studies could build upon the present work to investigate the influence of other digital interactive media.

Third, the present thesis considers a limited number of dependent variables regarding political attitudes. Further research on what VAAs could also achieve for pre-voters is needed. Further investigation among pre-voters is a promising avenue for further research, as some surveyed teachers noted that their pupils found the *Test électoral éducatif* to be very eye-opening. One teacher reported that the VAA allowed pupils to connect their beliefs with the party offerings. Future research might investigate whether VAAs lead to increased issue congruence between pre-voters and parties. In addition, one could test whether the findings observed among adult voters regarding turnout, vote choice, political knowledge, and information-seeking behaviors (see Table 1 in Chapter Two) also hold for pre-voters. As about 40% of the participating pre-voters within our study were found to have no prior opinions on some political parties, research investigating whether VAAs would help these users to form an opinion might be particularly relevant.

Fourth, our research lacks evidence on classrooms' collective dynamics. Our study shows that such a short VAA intervention can have an actual causal impact on pre-voters' political attitudes. Yet, one might suggest that the VAA impact might be amplified with a classroom discussion follow-up. Evidence from our study showed that it might take time, consideration, and guidance from teachers for pupils to gain from the VAA. While the VAA is intended for individual use, teachers can initiate collective discussion and debate to enlighten the personalized voting profile pupils received. In addition, as advice exposure proved to somewhat jeopardize pre-voters' IPE at first (see Chapter Five for analyses on the advice effect), teachers who appeal to the VAA in the classroom must provide their pupils with further guidance in processing their voting advice, so as not to leave them on their own with a deteriorated sense of IPE. Moreover, classroom discussion teaches pupils to collectively construct knowledge and experience deliberation. Classroom deliberation supports a shared belief in the relevance of democracy, as it is achieved collectively and therefore influences young people's futures as voters and citizens (Blankenship, 1990; Dassonneville et al., 2012; Lafaye, 2008). Hence the teacher's role is to support collective discussion in valuing opinions, supporting openness, and caring for diversity to carry out deliberation and advance reflection (Maurissen, 2018; Torney-Purta, 2001). In that sense, further research strategies can be implemented to gain insight into collective classroom dynamics such as observational research methods or diary study. The latter allows participants to record their

experiences, which may help researchers to better understand the complexities of human experience and its (inter)individual variation in everyday life.

Lastly, further research is required to overcome the limited statistical power issues, especially as we investigate the question of inequalities and match effect (see Chapter Six). We acknowledge that the small sample size issue has implications on the validity of the study. This limitation arises from study attrition in some subgroups. As we encounter low statistical power, the generalizability of the findings might be limited. Either increasing the sample size or conducting replication studies would be advisable. Given the limited scope of the current study, a dedicated study to investigate the different types of VAA advice with a sample of VAA users could contribute to a more comprehensive understanding of the match effect. It would also be beneficial to conduct interviews with pupils, teachers, or other stakeholders to complement survey results. Additionally, observing the VAA use and follow-up activities, possibly through video recording or eye-tracking technology, could provide valuable insights. On another note, the present study does not acknowledge effects in the longer run. To go a step further, it is necessary to collect follow-up data over a longer timeframe. The involvement of the different stakeholders and target groups of the study in action research enables us to address real-world challenges and co-create leading solutions. Such a longitudinal approach would be challenging, as it involves developing a research vision, and planning based on a timeline of several (school) years to access and contact young people, even more so after they leave the school system.

7.4. Contributions

The present section discusses both the scientific and normative contributions of our research. Our findings contribute to advancing understanding in the field of VAAs, but also education research and young people's political attitudes. First, we present the implications of our research findings for VAA design and practices in Section 7.4.1. Second, among the scientific contributions, we can list theoretical, empirical, and methodological contributions. This is discussed in Section 7.4.2. In turn, we present the practical contributions of our work in Section 7.4.3. The findings discussed in the present thesis allow us to shape best practices and guidelines for educational stakeholders.

7.4.1. Implications for VAAs' Design

This study has laid the groundwork for the prospects of the VAA research agenda. We can only encourage improvement of the tool to reach greater educational potential. The mixed results of our research lead us to reflect on the design of the application itself. In the present section, we reflect and speculate about VAA designs. One might expect that VAAs would have different or larger impacts with alternative designs. The challenge of engaging with an audience with few political or cognitive resources remains. Our findings show that the design of VAAs for education still needs improvement, as they fail to narrow political inequalities between pupils. In the present section, we identify a range of possible avenues for improving the functionalities of the *Test électoral éducatif*, building on existing (youth) VAAs abroad. We present three main avenues for VAAs' design: conversational agents, streamlined versions, and refinements to statements' selection and wording.

Firstly, recent research demonstrated the assets of Conversational Agent Voting Advice Applications (CAVAAs) in providing users with further guidance. Conversational agents, also known as chatbots, can be integrated into VAAs to provide user support and information on demand. Integrated chatbots are able to assist users who have difficulty comprehending a VAA's statements. CAVAAs can be programmed to respond to users' prompts, providing semantic information on the meaning of difficult words in the statements, pragmatic information about the current state of affairs, or other relevant information (i.e., advantages and disadvantages of the policy, or party arguments) (Kamoen & Liebrecht, 2022; Kamoen et al., 2022). CAVAAs can also assist users in processing their personalized political profile to provide information about political parties (i.e., parties' histories, leaders, and backgrounds). In that sense, as our research findings brought evidence that the VAA output tends to undermine the sense of political efficacy of pre-voters who might lack the political cognition to interpret such information, CAVAAs might adequately guide the processing of VAA information.

Secondly, VAA designers offer aggregated or simplified versions of VAAs geared toward less politically interested citizens. The Swiss VAA, *Smartvote*, comes in two versions: Designers implemented a short form of 30 questions alongside a long form made up of 75 questions (Pianzola et al., 2019). We can also name the *MNM Stemtest,* aimed at Flemish youth. This VAA gathers 30 statements in a single questionnaire for all elections held in May 2019, i.e., regional, federal, and European elections. The *MNM Stemtest* also offers users the additional functionality of tracking the evolution of their matching with the parties through the questionnaire. As we find a limited impact of the *Test électoral éducatif* on participants, we might suppose that its design is not fully adapted to

pre-voters' concerns or level of comprehension. One might expect that VAAs specifically geared towards youths might have a greater impact. However, this type of VAA is based on aggregated and less precise information, which in turn provides less accurate "political profiles" and less congruent advice.

Moreover, as we detect statement effect, we must highlight the importance of VAA statements' selection and wording. Some VAAs are targeted at young users, and designed to fit their concerns. We point to the *Youth Vote Compass* in Canada, which offers alternative statements for young target groups, as it tackles cross-cutting issues rather than issues specific to a given election. This edition of the Canadian VAA is designed for students and teachers to explore the political landscape. Hence, the wording and content of the VAA are adapted to young users. The Youth Vote Compass is part of a larger civic education program, i.e., *Student Vote*, supported by the *CIVIX* organization. The youth VAA is supplemented by other resources such as videos (e.g., at levels of government, voting, and political parties) or classroom activities and teaching material (e.g., on campaign communication, election issues, and citizens' rights and responsibilities) within the Student Vote program. This also leads us to make recommendations for education practices (see Section 7.4.3. below).

7.4.2. Scientific Contributions

Our study contributes to advancing understanding in social research. The present section discusses the scientific contributions of our research. First, we address theoretical contributions in providing new theoretical insights, concepts, and frameworks that can be applied to future research. Hence, we discuss our insight on VAA effects processes, VAA use in the classroom, and measuring genuine VAA effects. Second, we bring empirical contributions in challenging the assumptions from existing research. We provide first empirical evidence on VAAs' influence on political efficacy and trust, and we add to the body of evidence on late adolescents' political attitudes. And last, our methodological contribution is offering an original and replicable experimental design to examine a VAA's impact on pupils.

As a first theoretical contribution, our study improves the understanding of VAA effects processes. Our experimental design allows for distinguishing statement, advice, and match components of VAA effects. In doing so, we can determine what components of a VAA make a difference in influencing and affecting voters. In addition, our research provides conceptual fine-tuning in introducing the concept of the "statement effect". Existing VAA studies indeed acknowledge the importance of statement selection and wording (Kleinnijenhuis et al., 2017) but

our study is the first to empirically investigate the distinct impact of VAA statements on users' political attitudes. Table 1 in Chapter Two draws attention to the lack of studies on the statement effect, overshadowed by an extensive list of advice and match effect studies. Opening the black box of VAAs' impact, our study has brought to light the complexity of VAAs' effect processes. As discussed in Section 7.2 above, we showed that different types of effects yield various and nuanced effects. For instance, the findings reveal a significant impact of mere exposure to VAA statements on users' political attitudes. This is evidence that VAA research so far has failed to encompass this significant component of the phenomenon of VAA influence. Hence, our study puts forward a theory on the phenomenon of VAA effects, and explains the relationship between the different types of VAA effects and users' political attitudes. Therefore, we offer an innovative typology of VAA effects, as displayed in Figure 4 in Chapter Two. Especially when we acknowledge that some users face comprehension issues when responding to policy statements, it is crucial to consider the statement effect as separate from the advice effect in examining VAA impact and users' experience. As scholars delve into VAA effects, they must carefully discuss the impact of VAAs attributable to the VAA output but also the input.

The second theoretical contribution touches upon VAA use in the classroom. Our study offers a unique contribution to the field by addressing the previously neglected group of school-aged citizens. Although VAA scholars speculate that VAAs have great learning potential as a tool for citizenship education, and what is more, teachers and grassroots organizations indeed rely upon these tools in their educational practices, the empirical assessment of the impact of VAA-based teaching material is clearly lacking. The present research is the first experimental study to contribute empirical evidence on the effects of a VAA used as school teaching material. As we detect VAA effects among pre-voters, we can state that they are suitable tools for political education in secondary schools. Our empirical evidence provides insights on the various VAA effects relevant to work on pre-voters' political efficacy and trust (see Section 7.2. "Main Findings" above).

In addition, the present study brings empirical contributions. Our research is among the first to bring evidence of VAAs' impacts on political efficacy and trust. The latter are DVs barely explored in existing VAA research. Although these are central constructs to understanding long-term engagement, they have been overlooked in VAA impact research. Only van de Pol's (2016) doctoral thesis tackles internal political efficacy as a dependent variable of VAA usage. Our research findings add up to his work and demonstrate that VAAs make a positive contribution to the development of IPE, as well as EPE and political trust. Moreover, our experimental research allows providing first evidence of causal links between VAA use and these attitudes. The present study

can thus constitute a foundation for further works to address the issue of VAAs' effects on these three key attitudes.

As a second empirical contribution, considering the study's findings, we can make further claims on the significance of the late adolescent years in building political attitudes. Political trust is a stable attitude. And yet, we detect a significant positive effect of the VAA on political trust among pre-voters. This suggests important insights for research in many fields such as political attitudes, media, or educational research. On one side, this is evidence that pre-voting age is a pivotal period to build one's political trust. Even though pre-voters have very little first-hand political experience, there is empirical evidence that they are responsive to efforts to build their sense of political trust. In that sense, this is evidence against the hypothesis that political attitudes develop only once one enters working life or faces duties as they reach adulthood. Our research corroborates the findings of Hooghe and Wilkenfeld (2008), Quintelier (2008), Stiers et al.(2020), and Uslaner (2002): political trust should be developed and acquired at the pre-voting age. The same goes for political efficacy (Levy, 2013; Sohl & Arensmeier, 2015).

As a last empirical contribution, our findings on IPE and EPE confirm claims in the education and youth socialization literatures. While education has a great positive influence on IPE, it is the direct experience of participation that builds a positive sense of EPE (Dauer et al., 2021; Levy, 2013). A sense of IPE, more than EPE, is acquired with the political knowledge and skills gained through political learning experiences. Yet a sense of EPE, and to a lesser extent IPE, is developed with participatory opportunities, and when achieving political goals. Young individuals are thus less likely to feel that citizens' voices can be heard before experiencing any active participation opportunities or achieving any actual political goals (Levy, 2013). It is therefore essential to offer such experiences to those young people who do not yet have the right to vote, and thus the opportunity to go through a voting process, or to express their views at the ballot box. We further discuss avenues for experiences of political participation, such as simulation games or classroom discussion, in Section 7.4.3 below.

In addition, the present research brings one major methodological contribution. Our research provides an original and replicable mixed experimental design within and between groups to unravel the effects of VAAs. We provide a thorough description of the experimental design in Chapter Three to allow replication in other settings. We ensured that experimental settings and procedures that produce valid research were offered, closely representing real-life circumstances of a classroom with a multitude of varying factors. Our experimental design can form a useful basis for future research on individual VAA use and its collective follow-up. In addition, we extensively

address the issues of study validity in Chapter Three. By doing so, we can control for individuals' background characteristics that influence their sense of political efficacy and trust, and isolate the direct effect of VAA exposure. Therefore, our assessment of VAA effects and the recommendations arising from this can be considered solid. We provide normative and practical recommendations in the following section.

7.4.3. Implications for Education Practices

Finally, our study has important implications for education practices. A VAA is such a short intervention, yet is found to have lasting effects in the medium run. It could be that the short VAA information stimulus has a lasting impact if it is reinforced by subsequent experiences, information, or discussion. In addition, pre-voters are indeed more subject to attitude change than adults as they are still in the process of developing their political beliefs and attitude. A VAA is a valuable tool for raising political awareness and promoting discussion on political issues. In the present section, we emphasize the ease of implementation and variety of use of a VAA in a teaching program. In addition, we provide input on the significance of citizenship education, as well as media and political information literacy facilitations.

Our findings demonstrated that a VAA intervention has an actual educational impact on pre-voters. Teachers are continually expected to seek ever novel ways to actively engage pupils in learning activities under tight budgets and limited time. VAA usage is a well-suited short intervention likely to be implemented in larger programs under tight budgets. VAAs are easy to implement by teachers, as opposed to larger programs such as simulation games or field trips to parliament buildings. There is no formal prerequisite for teachers, such as training on how to implement the tool in the classroom. Yet, toolkits, extra material, and cooperation with extracurricular partners can be provided to support teachers in successfully implementing VAAs in class. Besides, the use of the *Test électoral éducatif* meets teachers' needs in the hybridization of teaching for those who are willing to provide their pupils with the tools to decipher reams of political information.

In addition, VAAs are versatile tools that might be implemented at different stages of a teaching program. Our study demonstrated that VAAs have diverse effects on various political attitudes among pre-voters. For instance, within the Student Vote program, the Youth Vote Compass is used for lessons on the federal political landscape. Yet, a VAA can also be used to raise awareness on political issues, their complexity, and the variety of opinions on the political spectrum. One participating geography teacher also reported being willing to appeal to the *Test électoral éducatif*

on a topic-specific lesson on town and country planning to illustrate the diversity of parties' opinions and difficulty to reach policy agreement on the issue. As teachers are required to maintain a neutral stance in class, they can also appeal to VAAs to tackle the topics of political parties, their opinion, their ideological placement, and party politics in general. Though one voter education activity may not be enough to have lasting and participatory effects, a strategy combining several information or education activities might prove more successful. NGOs and associations who use VAAs as voter education activities could potentially complement this activity with a follow-up discussion, promote additional uses of the VAA, or provide additional types of voter information. Hence, VAAs are useful tools to introduce the topic of party politics as they simplify the complex and manifold aspects of politics to fit into one app, but the need for deliberation remains. This leads us to the following recommendation.

As a last concluding remark, we must stress the importance of media and political information literacy. Our research findings suggest that pre-voters might not be sufficiently equipped to treat political information as we find that their sense of IPE is shaken by political profile information. In addition, they might experience cognitive dissonance as they deal with incongruent advice. On another note, pre-voters show varying levels of proficiency in processing political information. As young people access online news and social media platforms for their political information, media and political information literacy should therefore be important steps in educating citizens. Such media literacy education goes hand in hand with science and democracy education as regards working on critical thinking. Approaches to developing critical thinking include, for instance, argument analysis (identifying, constructing, and evaluating arguments) and collaborative learning (group work and discussion to analyze and evaluate information). It is crucial to teach pupils to identify when they are experiencing cognitive dissonance and comprehend the causes and consequences of this phenomenon. Helping pupils to cope with cognitive dissonance involves encouraging open-mindedness, self-reflection, intellectual humility, and equipping them with the skills and knowledge to critically evaluate information. VAAs can indeed play a role in these education efforts, especially as teenagers from age 16 will gain access to the ballot box in the upcoming European elections. In this respect, VAAs are useful instruments to build pre-voters' feelings of political efficacy and political trust so they take the initiative to register, and then cast an informed vote. Unraveling the impact of VAAs allowed us to unveil the digital tools' insightfulness, forging a path towards informed and active citizens, empowered to shape the future of our democratic societies.

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Appendix A

Appendix A.1. Overview of the Methodology of the *Test électoral éducatif*

The use of VAAs is widespread in Belgium, especially in the Flemish region where a VAA has been established since 1999 (Walgrave, van Aelst, & Nuytemans, 2008). The francophone version of this VAA, i.e. *Test électoral*, was launched in 2014 for the first time. The *Test électoral/Stemtest* is the fruit of the collaboration of journalists and scholars from the University of Antwerp and UCLouvain that have joined in identifying relevant policy issues for the 2019 election campaign. Political parties included in the VAA were contacted with an official invitation email and a list of policy statements. All parties self-reported their answers and argument on each statement. Scholars then compared these party-generated positions with their own expert judgments and, in case of discrepancies, asked the respective party to provide more support for its documented position. The VAA does not only rely on information intentionally divulged by political parties but their positions were also subject to corrections by experts. Additionally, party manifestos' data provides evidence of the salience of issues for political parties (Ferreira da Silva et al., 2021), and allows for weighting issue questions by their importance to political parties.

Although most VAA makers abroad opt for Likert scales to structure response options, the Belgian VAA relies on binary response options. Some users have expressed their discontent on social media as they would have liked to have a wider range of nuanced response options. In this regard, the makers of the Belgian VAA argue that each statement should be thought-provoking and engage substantive reflection and discussions. The goal is to lead users to position themselves since they have to cast votes for parties or candidates that, once elected in an assembly, will have to position themselves in favor of or against a proposed law (or to abstain) at the time of decision-making: there is no room for nuance when it comes to voting laws. Just as members of parliaments have the possibility to abstain, users of the *Test électoral* can also choose to skip a VAA statement (as illustrated in Figure 3a above: *ignorer cette proposition*).

Designers have implemented two innovative features to provide users with guidance to take up a position on VAA statements. On the one hand, the *Test électoral/Stemtest* provides semantic information on the meaning of difficult words in the statements. The user can click or tap on the underlined sections of the text to display the definition for the terms used in the statement (see for instance, *impôts sur les bénéfices des sociétés,* as illustrated in Figure 3a). On the other hand, the user is provided with party arguments for each policy issue contained in the VAA. Simultaneously, as the user answers policy statements, anonymized parties' arguments for each statement can be displayed.

Once VAA users have access to their personalized VAA advice webpage, they have the possibility of selecting the respective parties or statements they wish to display arguments for.

The VAA compares and measures the alignment between the users' political beliefs and those of political parties. The *Test électoral/Stemtest* takes account of issue salience, i.e., the importance of an issue to both users and parties, in computing voting advice output (Lefevere & Walgrave, 2014). Users are offered the possibility of indicating particular salience up to five items so as to reflect the salience a user attributes to policy statements relative to one another. In the same way, each party's electoral program has been benchmarked to identify their issue salience considerations, and in turn, to allocate weight for statements on each respective issue and party. Since its 2019 iteration, the *Test électoral/Stemtest* introduced an innovative feature for users whose VAA output renders closely matching scores between the top two parties. These users are offered the option to take up 5 additional statements to break the tie between the two parties.

The visualization of the "political profile" on the results page is presented in the form of a ranking in ideological proximity order of the seven available francophone parties, as illustrated on the right side of Figure 3. Ranking lists are instructive and easily interpretable by laypeople for the sake of their results' comprehension and the instrument's validity. The percentages for each party in the ranking list specify the degree of matching between the user and each respective party, as set out in Figure 3. Hence, the users grasp which parties are closer to their individual beliefs and which are further off. Only francophone parties are displayed on the results page of the users of the francophone federal and European VAA. Users are offered the possibility of displaying Flemish parties in their "political profile" ranking list. Correspondingly, the Dutch-language VAAs can also display results including francophone parties.

It must be noted that the *Test électoral éducatif* consists of the same content as the *Test électoral* available during the 2019 election campaign. As soon as the election was held, the tools remained freely available under the label *Test électoral éducatif*.[16] In this way, education stakeholders can draw on the VAA for its political information and educational purposes. It is also for this reason that the political party *Parti Populaire* (PP) remains visible, even though PP was dissolved by party authorities, as it failed to obtain any seats in the assemblies for which elections were held in May 2019.

[16] Accessible online via https://www.testelectoraleducatif.be/

Appendix A.2. Ethical Considerations

We must carefully follow a rigorous set of guidelines, especially with young individuals considered a vulnerable group, in order to ensure the dignity and welfare of all parties involved in the research (Clark et al., 2019, p. 125–129). My research conduct fulfills requirements for participants' protection, as stated by Lewis & Porter (2004). The ethical considerations in data collection, management, and analysis of the present study were approved by the ISPOLE ethics review committee.

Firstly, it is the researcher's responsibility to assess the participants' ability to give fully informed consent. This has been discussed with appropriate stakeholders, such as school principals and teachers. The researcher obtained the consent of school principals, teachers, and pupils for each intervention. Although the various waves take place in the classroom, under the authority of the teacher, student participation is voluntary. Pupils' consent is informed and voluntary. Pupils had to fill in online questionnaires after agreeing to a GDPR disclaimer and getting an informed consent form for each wave of the experiment. Participants are reminded of their right to withdraw at an appropriate interval, i.e., in the informed consent form at the beginning of each wave. From the age of 16, parental consent is not required (General Data Protection Regulation, 2016; Loi Relative à La Protection Des Personnes Physiques à l'égard Des Traitements de Données à Caractère Personnel, 2018).[17] Some school principals still wanted parents to be informed of my intervention. Therefore, the researcher prepared a short note addressed to the parents, briefly presenting my research.

Secondly, the participants' understanding of confidentiality, as well as research purposes, has been examined. The informed consent form was approved by the ethics review committee based on a template provided by the university and used for many online surveys. Of course, it has been adapted to the target population, to ensure that the adolescents understand the information regarding confidentiality and anonymity, along with the limits to their participation. As regards research purposes, even though we used deception in the first instance, participants were informed of the study's objective right after the last phase of the experiment.

[17] GDPR: Art 8. 1 Where point (a) of Article 6 applies, in relation to the offer of information society services directly to a child, the processing of the personal data of a child shall be lawful where the child is at least 16 years old. Where the child is below the age of 16 years, such processing shall be lawful only if and to the extent that consent is given or authorized by the holder of parental responsibility over the child. Member States may provide by law for a lower age for those purposes provided that such lower age is not below 13 years.

C − 2018/40581: Art. 7. En exécution de l'article 8.1 du Règlement, le traitement des données à caractère personnel relatif aux enfants en ce qui concerne l'offre directe de services de la société de l'information aux enfants, est licite lorsque le consentement a été donné par des enfants âgés de 13 ans ou plus.

Thirdly, all possible steps to ensure anonymity have been taken. This was one of the major concerns of school principals. In any case, we only gathered information on the birth date, gender, and principal teacher for each respondent, in order to identify each pupil across waves. We have not been provided with any information allowing me to personally identify the participants. We did not collect email addresses, as they could contain information on the first and/or last name of the respondents.

And lastly, when providing feedback, we ensured the information had been understood. The researcher offered debriefing in the classroom with case study material and, for those who took their last survey remotely, we disseminated a report on the study.

Appendix A.3. Report on the Pilot Experiments: The Feasibility Study

Pilot classroom trials were conducted in view of a definitive trials stage. Initially, the intervention's potential was evaluated with a small number of classrooms randomly assigned to each intervention condition. Pre-tests of small-scale experiments play an informative role in the preliminary stages of the research to underpin measurement validity and standardize the experimental intervention as much as possible (Levin & O'Donnell, 1999; Slavin, 1999). This pilot phase took place between September and November 2019. The purpose of a pilot trial (to assess feasibility) is different from a definitive trial (to assess effectiveness or efficacy). Pilot trials primarily aim to assess feasibility and investigate areas of uncertainty about future definitive trials in terms of design, recruitment, use and acceptability of the interventions, as well as data collection methods. In turn, we could proceed with amendments to the protocol discussed in the present chapter. Furthermore, the researcher gained practical experience in delivering the intervention.

Six classes from three different schools in the Walloon Brabant and Liege provinces took part in the pilot tests. The first wave of data collection occurred in September 2019, the second wave and intervention occurred in October 2019, and Wave 3 with a debriefing in the classroom took place in November 2019. Two classes in technical education (specialization in accounting) in the 5th and 6th years of secondary education in the official education system were assigned to the "advice effect" group. Two classes in general education in the 4th year of secondary education in a Catholic school (specialization in social science) were assigned to the "statement effect" group. Two classes in general education in the 6th year of secondary education in a Catholic school were assigned to the control group.

The study of the feasibility trials had four sets of objectives. The first objective was to estimate feasible recruitment for the definitive trials. The concern we initially had about the lack of openness of Catholic schools to my project was finally unfounded since 75% of the sampled schools are Catholic schools.[18]

The second objective was to decide between two possible time periods of either one or two months between each wave of the trials. The one-month timing between each wave is sufficient for students to not attribute their behavioral changes to the activity performed in my experiment. Students consider this activity as an integral part of their course material with their regular teacher rather than as an external intervention. It fits with the school calendar, especially since teachers are willing to address different subjects for the rest of the semester. This timing is, therefore, more

[18] 64.9% of secondary school pupils are affiliated with the free school network in the French community of Belgium. (*Les indicateurs de l'enseignement 2019, Administration générale de l'Enseignement*)

consistent with a real-life teaching schedule. In addition, a shorter time period ensures a higher retention rate.

The third objective was to assess the comprehensibility of the questionnaires. There are indeed implications for progression from pilot to future definitive trial, including amendments in the questionnaires. Throughout the pilot trials, the researcher kept a logbook to account for students' misunderstandings, their comments in the free-text comment field, as well as those of the teachers. The main flaw in the first questionnaire was about party identification and left-right concepts. The students reported that they did not know the notion of left and right in political terms or some of the available political parties. Consequently, we added a "not applicable" option for these items.

The fourth main objective was to assess the feasibility and acceptability of the interventions. The pilot trials focused on the VAA designed for the Walloon elections. However, the VAA designed for the federal elections is used for the definitive trials. Thus, teachers can use this VAA to mention the Flemish parties in the classroom as well. Indeed, pupils also reflect upon the Flemish parties covered in the news media in French-speaking Belgium. Some teachers, therefore, wish to mention these parties in their curriculum. This adaptation was made in order to ensure a greater fit between my intervention and the pedagogical objectives of the teachers.

Table A.1. ANOVA for Advice Congruence and Baseline Political Interest

	df1	df2	Sum Sq	Mean Sq	*F*	*p*
Advice Congruence (Breakpoint = 8)	2	93	100.325	50.162	6.550	.002
Advice Congruence (Breakpoint = 7)	2	93	111.780	55.890	7.418	.001
Advice Congruence (Breakpoint = 6)	2	93	81.359	40.680	5.174	.007
Advice Congruence (Top 3)	2	93	109.773	54.886	7.264	.001

Note: Sum Sq = Sum of Squares; Mean Sq = Mean Square.

Table A.1 shows that all ANOVA tests can be considered to be robust with a p-value. ANOVA tests results reveal that there are significant between-group differences for each measure of advice congruence.

Table A.2. Advice Congruence and Baseline Political Interest: Between Group Comparisons

	Intervention group	Mean Difference	*p*
Advice Congruence (Breakpoint = 8)	Activating vs Incongruent	-1.03	.232
	Activating vs Congruent	-2.96*	.001
	Incongruent vs Congruent	-1.93*	.043
Advice Congruence (Breakpoint = 7)	Activating vs Incongruent	-.48	.772
	Activating vs Congruent	-2.43*	.001
	Incongruent vs Congruent	-1.95*	.019
Advice Congruence (Breakpoint = 6)	Activating vs Incongruent	-.62	.710
	Activating vs Congruent	-2.03*	.006
	Incongruent vs Congruent	-1.41	.162
Advice Congruence (Top 3)	Activating vs Incongruent	-.94	.516
	Activating vs Congruent	-2.43*	.001
	Incongruent vs Congruent	-1.49	.133

Note: * The mean difference is significant at the 0.05 level.

All robustness tests displayed in Table A.2 above reveal that pre-voters exposed to activating advice or incongruent advice show lower political interest than those exposed to congruent advice.

Table A.3. Within-Group Mean Score and Differences in IPE

Intervention group		IPE w3	IPE w2	IPE w1	w2-w1	w3-w1
Control	Mean	3.16	3.03	2.99	0.04	0.17
	N	152	152	152		
Statement	Mean	3.35	3.22	3.07	0.15	0.28
	N	156	156	156		

Table A.3 indicates that the control group shows an improvement of 0.17 in IPE between Wave 1 and Wave 3. The statement group reports an improvement of 0.28 on the IPE scale.

Table A.4. Within-Group Mean Score and Differences in EPE

Intervention group		EPE w3	EPE w2	EPE w1	w2-w1	w3-w1
Control	Mean	2.66	2.53	2.47	0.06	0.19
	N	152	152	152		
Statement	Mean	2.58	2.35	2.39	-0.04	0.19
	N	156	156	156		

Table A.4 indicates that the "statement effect" and control groups both show a score improvement of 0.19 in EPE between Wave 1 and Wave 3.

Table A.5. Within-Group Mean Score and Differences in Political Trust

Intervention group		Trust w3	Trust w1	w3-w1
Control	Mean	4.44	4.23	0.21
	N	76	76	
Statement	Mean	4.43	4.18	0.25
	N	111	111	

Table A.5 shows that the control and statement groups do not differ from each other in the first wave. At the end of the study, the statement and control groups show a similar level of trust in political institutions with a score of respectively 4.43 and 4.44. The control group shows a score improvement of 0.21 in political trust between Wave 1 and Wave 3. The statement group shows a score improvement of 0.25 in political trust between Wave 1 and Wave 3.

Table A.6. Correlation Matrix (IPE models)

	1	2	3	4	5	6	7	8
1	/							
2	**.745**	/						
3	**.704**	**.755**	/					
4	-.018	.036	.018	/				
5	.042	.046	.053	.125	/			
6	.090	.134	.146	.038	.281	/		
7	.064	.086	.077	-.263	.085	.086	/	
8	.030	.014	.074	-.271	.090	.306	.462	/

Notes: 1 IPE Wave 3. 2 IPE Wave 2, 3 IPE Wave 1, 4 Intervention group, 5 Mother's highest diploma, 6 Educational track, 7 School Year, 8 School SES, Correlations greater than .500 are shown in bold.

The correlation matrix displayed in Table A.6 reveals that only the three IPE variables measured at the three time-points are highly correlated with each other. We find no other strong interdependence among our independent and dependent variables.

Table A.7. Correlation Matrix (EPE models)

	1	2	3	4	5	6	7	8
1	/							
2	**.648**	/						
3	**.526**	**.548**	/					
4	-.023	.031	-.041	/				
5	.087	.122	.098	.125	/			
6	.072	.151	.088	.038	.281	/		
7	.030	.053	.036	-.263	.085	.086	/	
8	.063	.085	.037	-.271	.090	.306	.462	/

Notes: 1 EPE Wave 3, 2 EPE Wave 2, 3 EPE Wave 1, 4 Intervention group, 5 Mother's highest diploma, 6 Educational track, 7 School Year, 8 School SES; Correlations greater than .500 are shown in bold.

The correlation matrix displayed in Table A.7 reveals that only the three EPE variables measured at the three time-points are highly correlated with each other.

Table A.8. Correlation Matrix (Political Trust Models)

	1	2	3	4	5	6	7
1	/						
2	**.589**	/					
3	-.119	-.007	/				
4	.108	.096	.125	/			
5	.097	.132	.038	.281	/		
6	.006	.041	-.263	.085	.086	/	
7	.137	.064	-.271	.090	.306	.462	/

Notes: 1 Political trust Wave 3, 2 Political trust Wave 1, 3 Intervention group, 4 Mother's highest diploma, 5 Educational track, 6 School Year, 7 School SES, Correlations greater than .500 are shown in bold.

Multicollinearity tests illustrated in Table A.8 reveal that political trust measured at Waves 1 and 3 are found to correlate with each other.

Table A.9. Linear Mixed Models For Statement Effect (Robustness Checks)

	IPE Wave 2				EPE Wave 2			
	I	*p*	II	*p*	I	*p*	II	*p*
Statement Exposure (ref. = Control Group)	**.130 (.057)**	.023	**.133 (.062)**	.033	-.090 (.113)	.426	-.051 (.129)	.706
Baseline DV	**.707 (.031)**	<.001	**.709 (.032)**	<.001	**.542 (.043)**	<.001	**.594 (.046)**	<.001
Mother's Edu. Attainment: Higher Education (ref. = Secondary)			-.017 (.076)	.823			.021 (.071)	.765
General Track (ref. = Technical)			.028 (.074)	.700			-.025 (.118)	.834
School Year = 6 (ref. = 5)			-.062 (.063)	.319			.035 (.063)	.584
Constant	**.890 (.100)**	<.001	**.869 (120)**	<.001	**1.149 (.141)**	<.001	**.981 (.160)**	<.001
N Pupils	426		382		426		382	
R-squared	.575		.580		.285		.326	
Log Likelihood	766.943		689.953		709.941		629.763	
AIC	772.943		695.953		715.941		635.763	
BIC	785.085		707.742		728.083		647.552	
Within School Variance	.084		.093		.064		.076	
Between School Variance	.182		.225		.114		.169	

Notes: Standard errors are in parenthesis. *N* classes = 30, *N* schools = 13.

Table A.9 displays linear mixed models for the statement effect on IPE and EPE measured in Wave 2, considering the sample of all participants who partook in the first two waves of the study, regardless of their participation in the last wave. Contrarily to the linear mixed models displayed in Table 11 of Chapter four, school SES is not included as a control variable, as this data was collected in the teachers' questionnaires at Wave 3. We do not find any significant evidence of statement effect on IPE measured at Wave 2 (Coeff. Statement effect in the full model = .133, p = .062). Regarding the immediate statement effect on EPE, we do not find any statistically significant relationship between statement exposure and EPE measured at Wave 2.

Table A.10. *T*-tests for DV Change and Statement Effect by SES (Robustness Checks)

	Low SES			High SES					
Variable	*M*	*SD*	*N*	*M*	*SD*	*N*	*df*	*t*	*p*
Internal Pol. Efficacy									
Control Group									
Wave 1 to Wave 2	.02	.61	43	.05	.59	162	203[1]	-.290	.772
Statement Group									
Wave 1 to Wave 2	.16	.82	47	.11	.63	166	62.035	.320	.750
External Pol. Efficacy									
Control Group									
Wave 1 to Wave 2	-.03	.49	43	.07	.49	162	203[1]	-1.212	.227
Statement Group									
Wave 1 to Wave 2	.09	.81	47	.00	.68	.166	.241	.707	.482

Notes: [1]Assuming equal variance. Statistical significance: *** p-value ≤ 0.001 • ** p-value ≤ 0.01 • * p-value ≤ 0.05 • $^{+}$ p-value ≤ 0.10.

Table A.10 displays results of *t*-test analyses on the DV changes over time between low- and high-SES pre-voters of the control and the statement group, considering the sample of all participants who took part in the two first waves of the study. We do not find any significant difference between low and high SES participants.

Table A.11. Within-Group Mean Score and Differences in IPE

Intervention group		IPE w3	IPE w2	IPE w1	w2-w1	w3-w1
Control	Mean	3.16	3.03	2.99	0.04	0.17
	N	152	152	152		
Statement	Mean	3.35	3.22	3.07	0.15	0.28
	N	156	156	156		
Advice	Mean	3.15	2.86	2.92	-0.06	0.23
	N	92	92	92		
Total	Mean	3.23	3.07	3	0.07	0.23
	N	400	400	400		

Table A.11 indicates that the "statement effect" group shows the greatest Wave 1 to Wave 3 growth in IPE, as they report an improvement of 0.28 on the IPE scale. The advice group shows an improvement of 0.23 in IPE between Wave 1 and Wave 3.

Table A.12. Within-Group Mean Score and Differences in EPE

Intervention group		EPE w3	EPE w2	EPE w1	w2-w1	w3-w1
Control	Mean	2.66	2.53	2.47	0.06	0.19
	N	152	152	152		
Statement	Mean	2.58	2.35	2.39	-0.04	0.19
	N	156	156	156		
Advice	Mean	2.73	2.52	2.56	-0.04	0.17
	N	92	92	92		
Total	Mean	2.64	2.46	2.46	0	0.18
	N	400	400	400		

Table A.12 indicates that the "statement effect" and control groups both show a score improvement of 0.19 in EPE between Wave 1 and Wave 3. The advice group shows an improvement of 0.17 in EPE at the end of the study.

Table A.13. Political Trust Index at Wave 3 and Wave 1

Intervention group		Trust w3	Trust w1	w3-w1
Control	Mean	4.44	4.23	0.21
	N	76	76	
Statement	Mean	4.43	4.18	0.25
	N	111	111	
Advice	Mean	5.05	4.28	0.77
	N	63	63	
Total	Mean	4.55	4.20	0.35
	N	250	250	

Table A.13 shows that the advice group has made the best average progress on the political trust scale (0.77 points) as the statement and control group show a similar increase of 0.21–0.25 points on the 11-point political trust scale.

Table A.14. Between-Group ANOVA

	df1	df2	Sum Sq	Mean Sq	*F*	*p*
IPE Wave 1	2	397	1.295	.647	.724	.486
IPE Wave 2	2	397	7.184	3.592	4.536	.011
IPE Wave 3	2	397	3.826	1.913	2.695	.069
EPE Wave 1	2	397	1.773	.886	2.381	.094
EPE Wave 2	2	397	2.847	1.424	3.261	.039
EPE Wave 3	2	397	1.227	.614	1.599	.203
Trust Wave 1	2	247	.427	.213	.068	.934
Trust Wave 3	2	247	21.634	10.817	3.648	.027

Notes: Sum Sq = Sum of Squares, Mean Sq = Mean Square.

Table A.14 displays one-way ANOVA tests for between-group differences on each measurement of the DVs. No baseline difference on IPE is found (F (2,397) = .724; p = .486). We find statistically significant differences between the groups' scores in IPE measured in Wave 2 (F (2,397) = 4.536; p = .011) and Wave 3 (F (2,397) = 2.695; p = .069). Turning to EPE, the one-way ANOVA reveals that there is statistically significant difference in EPE between at least two groups in Wave 1 (F (2,397) = 2.381; p = .094). In Wave 2, the ANOVA test also reveals statistically significant differences in EPE between groups (F (2,397) = 3.261; p = .039). We find no statistically significant wave 3 difference between groups in EPE (F (2,397) = 1.599 p = .203). Regarding political trust, we find no significant between-group difference in political trust at the beginning of the study (F (2,247) = .068; p = .934). We find statistically significant differences in political trust at the end of the study (F (2,247) = 3.648; p = .027).

Table A.15. Linear Mixed Models for Advice Effect (Robustness Checks)

	IPE Wave 2				EPE Wave 2			
	I	*p*	II	*p*	I	*p*	II	*p*
Advice Exposure (ref. = Control Group)	**-.066 (.093)**	.293	**-.115 (.068)**	.092	-.028 (.100)	.782	.007 (.093)	.942
Advice Exposure (ref. = Statement Exposure)	**-.192 (.062)**	.002	**-.246 (.068)**	<.001	.060 (.084)	.475	.080 (.083)	.371
Baseline DV	**.734 (.027)**	<.001	**.732 (.028)**	<.001	**.546 (.037)**	<.001	**.583 (.040)**	<.001
Mother's Edu. Attainment: Higher Education (ref.= Secondary)			-.026 (.063)	.678			.026 (.058)	.650
General Track (ref. = Technical)			.027 (.063)	.672			.063 (.076)	.430
School Year = 6 (ref. = 5)			.058 (.054)	.285			.040 (.056)	.480
School SES								
Constant	**.734 (.027)**	**<.001**	**.697 (.109)**	**<.001**	**1.121 (.110)**	**<.001**	**.980 (.120)**	**<.001**
N Pupils	583		514		583		514	
R-squared	.575		.585		.285		.326	
Log-Likelihood	1062.458		938.405		972.590		847.157	
AIC	1068.458		944.405		978.590		853.157	
BIC	1081.542		957.091		991.674		865.843	
Within School Variance	.069		.081		.073		.077	
Between School Variance	.159		.167		.136		.133	

Notes: Standard errors are in parenthesis. *N* classes = 50, *N* schools = 20.

Table A.15 displays linear mixed models for the advice effect on IPE and EPE measured in Wave 2, considering the sample of all participants who partook in the first two waves of the study. In Model II for IPE measured at Wave 2, we find that the participants exposed to VAA advice show lower IPE in Wave 2 compared to both the control (Coeff. = -.115, p = .068) and statement groups (Coeff. = -.246, p = .068). We do not find any significant immediate advice effect on EPE.

Table A.16. *T*-tests for DV Change and Advice Exposure by SES (Robustness Checks)

	Low SES			**High SES**					
Variable	*M*	*SD*	*N*	*M*	*SD*	*N*	*df*	*t*	*p*
Internal Pol. Efficacy									
Wave 1 to Wave 2	-.03	.59	51	-.07	.66	101	150[1]	.423	.673
External Pol. Efficacy									
Wave 1 to Wave 2	.02	.63	51	.02	.62	101	150[1]	-.002	.999

Notes: [1]Assuming equal variance. Statistical significance: *** p-value ≤ 0.001 • ** p-value ≤ 0.01 • * p-value ≤ 0.05 • $^{+}$ p-value ≤ 0.10.

Table A.16 displays *t*-tests for differences in the immediate match effect on IPE and EPE, using all participants from Wave 1 and Wave 2. We do not find any significant difference between low and high SES participants. This indicates that there is no significant differentiated advice effect based on SES.

Table A.17. *T*-tests for Match Effect on IPE (Robustness Checks)

	IPE Wave 1			**IPE Wave 2**					
Variable	*M*	*SD*	*N*	*M*	*SD*	*N*	*df*	*t*	*p*
Incongruent	3.08	.08	65	3.08	.09	65	64	.075	.940
Congruent	3.90	.11	31	3.85	.11	31	30	.445	.660
Activating	2.45	.11	58	2.33	.12	58	57	1.308	.196

Note: Statistical significance: * p-value ≤ 0.05.

Table A.17 displays *t*-tests for the immediate match effect on IPE, using all participants from Wave 1 and Wave 2. We do not find any significant change in IPE between Wave 1 and Wave 2.

Table A.18. Within-Group ANOVA for Match Effect on IPE (Breakpoint = 7)

	df1	df2	Sum Sq	Mean Sq	*F*	*p*
Incongruent	2	23	1.323	.662	1.041	.358
Congruent	2	29	.091	.045	.073	.930
Activating	2	31	1.759	.879	1.266	.286

Notes: Sum Sq = Sum of Squares; Mean Sq = Mean Square.

Table A.18 displays one-way ANOVA for match effect on IPE using the "Congruence (7–10)" measure. These tests allow for contrasting changes in average DV score over time (i.e., between Wave 1 and Wave 2; and between Wave 1 and Wave 3). No statistically significant over-time change in IPE is found.

Table A.19. Within-Group ANOVA for Match Effect on IPE (Breakpoint = 6)

	df1	df2	Sum Sq	Mean Sq	*F*	*p*
Incongruent	2	15	.728	.364	.534	.589
Congruent	2	35	.291	.145	.216	.806
Activating	2	31	1.759	.879	1.266	.286

Notes: Sum Sq = Sum of Squares, Mean Sq = Mean Square.

Table A.19 displays one-way ANOVA for match effect on IPE using the "Congruence (6–10)" measure. No statistically significant over-time change in IPE is found.

Table A.20. Within-Group ANOVA for Match Effect on IPE (Top 3)

	df1	df2	Sum Sq	Mean Sq	*F*	*p*
Incongruent	2	14	2.438	1.219	2.587	.086
Congruent	2	47	.205	.102	.153	.858
Activating	2	22	1.217	.608	1.018	.366

Notes: Sum Sq = Sum of Squares, Mean Sq = Mean Square.

Table A.20 displays one-way ANOVA for match effect on IPE using the "Congruence (Top 3)" measure. The only significant over-time change in IPE is found among pupils exposed to incongruent advice (see Table A.21 below for further details).

Table A.21. Within-Group Tukey's HSD for Match Effect on IPE (Top 3)

	Intervention group	Mean Difference	*p*
Incongruent	Wave 1 to Wave 2	.02	.996
	Wave 1 to Wave 3	.48	.119

Note: * The mean difference is significant at the 0.05 level.

Table A.21 displays pairwise comparisons for match effect on IPE using the "Congruence (Top 3)" measure among participants exposed to incongruent advice. We find no significant Wave 1 to Wave 2 change in IPE ($M = .02, p = .996$). We find a positive change in IPE between Wave 1 and Wave 3 among pupils exposed to incongruent advice ($M = .48, p = .119$).

Table A.22. *T*-tests for Match Effect on EPE (Robustness Checks)

	EPE Wave 1			**EPE Wave 2**					
Variable	*M*	*SD*	*N*	*M*	*SD*	*N*	*df*	*t*	*p*
Incongruent	2.49	.07	65	2.47	.07	65	64	.233	.817
Congruent	2.32	.13	31	2.40	.14	31	30	-.845	.405
Activating	2.46	.09	58	2.50	.09	58	57	-.483	.631

Note: Statistical significance: * p-value ≤ 0.05.

Table A.22 displays *t*-tests for the immediate match effect on EPE, using all participants from Wave 1 and Wave 2. We do not find any significant change in EPE between Wave 1 and Wave 2.

Table A.23. Within-Group ANOVA for Match Effect on EPE (Breakpoint = 7)

	df1	df2	Sum Sq	Mean Sq	*F*	*p*
Incongruent	2	23	.119	.059	.145	.865
Congruent	2	29	.914	.457	1.295	.278
Activating	2	31	.705	.352	1.039	.357

Notes: Sum Sq = Sum of Squares; Mean Sq = Mean Square.

Table A.23 displays one-way ANOVA for match effect on EPE using the "Congruence (7–10)" measure. No statistically significant over-time change in EPE is found.

Table A.24. Within-Group ANOVA for Match Effect on EPE (Breakpoint = 6)

	df1	df2	Sum Sq	Mean Sq	*F*	*p*
Incongruent	2	15	.004	.002	.005	.995
Congruent	2	35	1.262	.631	1.718	.184
Activating	2	31	.705	.352	1.039	.357

Notes: Sum Sq = Sum of Squares; Mean Sq = Mean Square.

Table A.24 displays one-way ANOVA for match effect on EPE using the "Congruence (6–10)" measure. No statistically significant over-time change in EPE is found.

Table A.25. Within-Group ANOVA for Match Effect on EPE (Top 3)

	df1	df2	Sum Sq	Mean Sq	*F*	*p*
Incongruent	2	14	.093	.047	.094	.910
Congruent	2	47	1.659	.830	2.422	.092
Activating	2	22	.487	.244	.722	.489

Notes: Sum Sq = Sum of Squares; Mean Sq = Mean Square.

Table A.25 displays one-way ANOVA for match effect on EPE using the "Congruence (Top 3)" measure. The only significant over-time change in EPE is found among pupils exposed to congruent advice (see Table A.26 below for further details).

Table A.26. Within-Group Tukey's HSD for Match Effect on EPE (Top 3)

	Intervention group	Mean Difference	*p*
Congruent	Wave 1 to Wave 2	.00	1
	Wave 1 to Wave 3	.22	.135

Note: * The mean difference is significant at the 0.05 level.

Table A.26 displays pairwise comparisons for match effect on EPE using the "Congruence (Top 3)" measure among participants exposed to congruent advice. We find no significant Wave 1 to Wave 2 change in IPE ($M = .00, p = 1$). We find a positive change in EPE between Wave 1 and Wave 3 among pupils exposed to congruent advice ($M = .22$ $p = .135$).

Table A.27. *T*-tests for Match Effect on Political Trust (Robustness Checks)

	Trust Wave 1			Trust Wave 3					
Variable	*M*	*SD*	*N*	*M*	*SD*	*N*	*df*	*t*	*p*
Congruence (8–10)									
Incongruent	4.45	1.50	29	4.72	1.55	29	28	1.140	.264
Congruent	5.52	1.77	9	6.56	1.21	9	8	2.972*	.018
Activating	3.38	2.03	15	4.82	2.03	15	14	2.833*	.013
Congruence (7–10)									
Incongruent	4.35	1.66	17	4.57	1.71	17	16	.654	.522
Congruent	4.98	1.54	21	5.63	1.49	21	20	2.477*	.022
Activating	3.38	2.03	15	4.82	2.03	15	14	2.833*	.013
Congruence (6–10)									
Incongruent	4.26	1.81	13	4.38	1.65	13	12	.307	.764
Congruent	4.93	1.48	25	5.56	1.54	25	24	2.759*	.011
Activating	3.38	2.03	15	4.82	2.03	15	14	2.833*	.013
Congruence Top 3 (8–10)									
Incongruent	3.89	1.83	9	4.70	1.95	9	8	1.545	.161
Congruent	4.80	1.51	34	5.41	1.52	34	33	2.702*	.011
Activating	3.10	2.26	10	4.20	2.13	10	9	1.527	.161

Notes: Statistical significance: *** p-value ≤ 0.001 • ** p-value ≤ 0.01 • * p-value ≤ 0.05.

Table A.27 displays *t*-test conducted to determine if there is a significant difference between Wave 1 political trust and Wave 3 political trust, using the various measures of advice congruence. Regarding pre-voters exposed to incongruent advice, we do not find any significant change in political trust. Regarding pre-voters exposed to congruent advice, all tests reveal statistically significant change in political trust. We see a statistically significant and positive average change in political trust over time for pre-voters exposed to congruent advice. Regarding pre-voters exposed to activating advice, we find statistically significant positive change in trust ($t(14) = 2.833$, $p = .013$). Using the "Congruence (Top 3)" measure, we find no statistically significant yet substantial positive change in political trust ($t(9) = 1.527$, $p = .161$).

Table A.28. *T*-tests Match Effect on IPE by SES (Robustness Checks)

	Low SES			High SES					
Variable	*M*	*SD*	*N*	*M*	*SD*	*N*	*df*	*t*	*p*
Incongruent									
Wave 1 to Wave 2	.09	.13	22	-.07	.08	41	61[1]	1.118	.268
Congruent									
Wave 1 to Wave 2	-.13	.14	10	-.01	.18	20	28[1]	-.434	.668
Activating									
Wave 1 to Wave 2	-.11	.14	19	-.12	.12	37	54[1]	.058	.954

Notes: [1]Assuming equal variance. Statistical significance: *** p-value ≤ 0.001 • ** p-value ≤ 0.01 • * p-value ≤ 0.05.

Table A.28 displays *t*-test analyses for short-run IPE changes between low- and high-SES pre-voters using the sample of all participants who took part in Wave 1 and Wave 2. We find no statistically significant difference in match effect between low- and high-SES pre-voters.

Table A.29. *T*-tests for Match Effect on IPE by SES (Breakpoint = 7)

	Low SES			**High SES**					
Variable	*M*	*SD*	*N*	*M*	*SD*	*N*	*df*	*t*	*p*
Incongruent									
Wave 1 to Wave 2	.11	.59	12	-.05	.47	14	24[1]	.697	.492
Wave 1 to Wave 3	.30	.58	12	.36	.50	14	24[1]	-.260	.797
Congruent									
Wave 1 to Wave 2	-.03	.48	11	-.12	.3	21	20[1]	.352	.727
Wave 1 to Wave 3	-.03	.64	11	.02	.78	21	20[1]	-.170	.866
Activating									
Wave 1 to Wave 2	-.10	.65	14	-.02	.80	20	32[1]	-.305	.763
Wave 1 to Wave 3	.38	.74	14	.15	.89	20	32[1]	.798	.431

Notes: [1]Assuming equal variance. Statistical significance: *** p-value ≤ 0.001 • ** p-value ≤ 0.01 • * p-value ≤ 0.05.

Table A.29 displays *t*-test analyses for IPE changes over time between low- and high-SES pre-voters using the "Congruence (7–10)" measure to assess the differentiated match effects. We find no statistically significant difference in match effect between low- and high-SES pre-voters.

Table A.30. *T*-tests for Match Effect on IPE by SES (Breakpoint = 6)

	Low SES			**High SES**					
Variable	*M*	*SD*	*N*	*M*	*SD*	*N*	*df*	*t*	*p*
Incongruent									
Wave 1 to Wave 2	.26	.66	9	-.18	.43	11	18[1]	1.798[+]	.089
Wave 1 to Wave 3	.24	.69	9	.24	.50	11	18[1]	-.016	.988
Congruent									
Wave 1 to Wave 2	-.10	.51	14	-.04	.71	24	36[1]	-.238	.813
Wave 1 to Wave 3	.07	.60	14	.12	.78	24	36[1]	-.183	.856
Activating									
Wave 1 to Wave 2	-.10	.65	14	-.02	.80	20	32[1]	-.305	.763
Wave 1 to Wave 3	.38	.74	14	.15	.89	20	32[1]	.798	.431

Notes: [1]Assuming equal variance. Statistical significance: *** p-value ≤ 0.001 • ** p-value ≤ 0.01 • * p-value ≤ 0.05.

Table A.30 displays *t*-test analyses for IPE changes over time between low- and high-SES pre-voters using the "Congruence (6–10)" measure to assess the differentiated match effects. The only statistically significant difference in match effect between low- and high-SES pre-voters is found among pupils exposed to incongruent advice. Between Wave 1 and Wave 3, low SES pupils exposed to incongruent advice tend to show an improvement in IPE (M = .26, SD = .66) as high-SES pupils exposed to incongruent advice show a decline in IPE (M =-.18, SD = .43, $t(18)$ = 1.798, p = .089).

Table A.31. *T*-tests for Match Effect on IPE by SES (Top 3)

	Low SES			High SES					
Variable	*M*	*SD*	*N*	*M*	*SD*	*N*	*df*	*t*	*p*
Incongruent									
Wave 1 to Wave 2	.04	.79	8	.00	.53	9	15[1]	.130	.898
Wave 1 to Wave 3	.38	.56	8	.52	.53	9	15[1]	-.503	.623
Congruent									
Wave 1 to Wave 2	.06	.45	18	-.10	.67	32	48[1]	.855	.397
Wave 1 to Wave 3	.12	.74	18	.05	.71	32	48[1]	.293	.771
Activating									
Wave 1 to Wave 2	-.15	.72	11	-.02	.84	14	23[1]	-.400	.692
Wave 1 to Wave 3	.30	.64	11	.14	.96	14	23[1]	.476	.639

Notes: [1]Assuming equal variance. Statistical significance: *** p-value ≤ 0.001 • ** p-value ≤ 0.01 • * p-value ≤ 0.05.

Table A.31 displays *t*-test analyses for IPE changes over time between low and high SES pre-voters using the "Congruence (Top 3)" measure to assess the differentiated match effects. We find no statistically significant difference in match effect between low- and high-SES pre-voters.

Table A.32. *T*-tests for Match Effect on EPE by SES (Robustness Checks)

	Low SES			High SES					
Variable	*M*	*SD*	*N*	*M*	*SD*	*N*	*df*	*t*	*p*
Incongruent									
Wave 1 to Wave 2	-.04	.14	22	-.02	.10	41	61[1]	-.070	.945
Congruent									
Wave 1 to Wave 2	.16	.15	10	.03	.12	20	28[1]	.641	.263
Activating									
Wave 1 to Wave 2	.01	.16	19	.08	.10	37	54[1]	-.377	.708

Notes: [1]Assuming equal variance. Statistical significance: *** p-value ≤ 0.001 • ** p-value ≤ 0.01 • * p-value ≤ 0.05.

Table A.32 displays *t*-test analyses for short-run EPE changes between low- and high-SES pre-voters using the sample of all participants who took part in Wave 1 and Wave 2. We find no statistically significant difference in match effect between low- and high-SES pre-voters.

Table A.33. *T*-tests for Match Effect on EPE by SES (Breakpoint = 7)

	Low SES			High SES					
Variable	*M*	*SD*	*N*	*M*	*SD*	*N*	*df*	*t*	*p*
Incongruent									
Wave 1 to Wave 2	.02	.64	12	-.13	.74	14	24[1]	.529	.602
Wave 1 to Wave 3	.02	.71	12	-.01	.47	14	24[1]	.141	.888
Congruent									
Wave 1 to Wave 2	.18	.47	11	-.13	.59	21	20[1]	1.510	.142
Wave 1 to Wave 3	.15	.40	11	.21	.55	21	20[1]	-.342	.735
Activating									
Wave 1 to Wave 2	.00	.79	14	.17	.54	20	32[1]	-.748	.460
Wave 1 to Wave 3	.34	.83	14	.14	.52	20	32[1]	.881	.385

Notes: Statistical significance: *** p-value ≤ 0.001 • ** p-value ≤ 0.01 • * p-value ≤ 0.05.

Table A.33 displays *t*-test analyses for EPE changes over time between low- and high-SES pre-voters using the "Congruence (7–10)" measure to assess the differentiated match effects. We find no statistically significant difference in match effect between low- and high-SES pre-voters.

Table A.34. *T*-tests for Match Effect on EPE by SES (Breakpoint = 6)

	Low SES			High SES					
Variable	*M*	*SD*	*N*	*M*	*SD*	*N*	*df*	*t*	*p*
Incongruent									
Wave 1 to Wave 2	.13	.68	9	-.15	.76	11	18[1]	.856	.403
Wave 1 to Wave 3	.03	.82	9	-.05	.51	11	18[1]	.268	.792
Congruent									
Wave 1 to Wave 2	.07	.49	14	-.12	.60	24	36[1]	1.010	.320
Wave 1 to Wave 3	.11	.41	14	.20	.52	24	36[1]	-.524	.603
Activating									
Wave 1 to Wave 2	.00	.79	14	.17	.54	20	32[1]	-.748	.460
Wave 1 to Wave 3	.34	.83	14	.14	.52	20	32[1]	.881	.491

Notes: Statistical significance: *** p-value ≤ 0.001 • ** p-value ≤ 0.01 • * p-value ≤ 0.05.

Table A.34 displays *t*-test analyses for EPE changes over time between low- and high-SES pre-voters using the "Congruence (6–10)" measure to assess the differentiated match effects. We find no statistically significant difference in match effect between low- and high-SES pre-voters.

Table A.35. *T*-tests for Match Effect on EPE by SES (Top 3)

	Low SES			High SES					
Variable	*M*	*SD*	*N*	*M*	*SD*	*N*	*df*	*t*	*p*
Incongruent									
Wave 1 to Wave 2	-.32	.49	8	.16	1.07	9	11.471	-1.211	.250
Wave 1 to Wave 3	-.34	.64	8	.13	.46	9	15[1]	-1.738	.104
Congruent									
Wave 1 to Wave 2	.18	.59	18	-.10	.52	32	48[1]	1.739^{+}	.089
Wave 1 to Wave 3	.22	.42	18	.17	.52	32	48[1]	.377	.708
Activating									
Wave 1 to Wave 2	.15	.78	11	.06	.44	14	23[1]	.360	.722
Wave 1 to Wave 3	.47	.87	11	.03	.55	14	23[1]	1.557	.133

Notes: [1]Assuming equal variance. Statistical significance: *** p-value ≤ 0.001 • ** p-value ≤ 0.01 • * p-value ≤ 0.05.

Table A.35 displays *t*-test analyses for EPE changes over time between low- and high-SES pre-voters using the "Congruence (Top 3)" measure to assess the differentiated match effects. The only statistically significant difference in match effect between low- and high-SES pre-voters is found among pupils exposed to congruent advice. Between Wave 1 and Wave 3, low-SES pupils exposed to congruent advice tend to show an improvement in EPE (M = .18, SD = .59) as high-SES pupils exposed to congruent advice show a decline in EPE (M = -.10, SD = .52, $t(48)$ = 1.739, p = .089).

Table A.36. *T*-tests for Match Effect on Political Trust by SES (Robustness Checks)

	Low SES			High SES					
Variable	*M*	*SD*	*N*	*M*	*SD*	*N*	*df*	*t*	*p*
Congruence (8-10)									
Incongruent									
Wave 1 to Wave 3	.13	1.55	10	.13	1.28	19	27[1]	.092	.928
Congruent									
Wave 1 to Wave 3	1.91	1.65	4	.79	.89	5	7[1]	1.191	.351
Activating									
Wave 1 to Wave 3	.27	.50	5	2.04	2.33	10	9.084	-2.077+	.067
Congruence (7-10)									
Incongruent									
Wave 1 to Wave 3	-.47	1.02	6	.61	1.44	11	15[1]	-1.496	.157
Congruent									
Wave 1 to Wave 3	1.47	1.35	8	.43	1.14	13	19[1]	1.667	.112
Activating									
Wave 1 to Wave 3	.27	.51	5	2.04	2.33	10	9.084	-2.077+	.067
Congruence (6-10)									
Incongruent									
Wave 1 to Wave 3	-.47	1.02	5	.50	1.70	8	11[1]	-1.140	.279
Congruent									
Wave 1 to Wave 3	1.47	1.35	9	.51	1.04	16	23[1]	1.696	.105
Activating									
Wave 1 to Wave 3	.27	.51	5	2.04	2.33	10	9.084	-2.077+	.067
Congruence (Top 3)									
Incongruent									
Wave 1 to Wave 3	-1.33	.47	2	1.43	1.15	7	7[1]	-3.191*	.015
Congruent									
Wave 1 to Wave 3	.96	1.23	12	.56	1.40	22	32[1]	.752	.458
Activating									
Wave 1 to Wave 3	.33	.47	5	1.87	3.16	5	4.178	-1.074	.314

Notes: [1]Assuming equal variance. Statistical significance: *** p-value ≤ 0.001 • ** p-value ≤ 0.01 • * p-value ≤ 0.05.

Table A.36 above displayed *t*-tests for political trust change between Wave 1 and Wave 3 across SES groups. We find no significant differentiated effect of incongruent or congruent advice exposure across low- and high-SES pre-voters. Regarding activating advice, all robustness testing using alternative measure of advice congruence (except "congruence (Top 3)" measure, $t(8) = -1.074$, $p = .314$) show that there is a positive activating advice effect on political trust among high SES pre-voters, while low-SES pre-voters do not seem to experience a raise of their sense of political trust through the study waves ($t(9.084) = -2.077$, $p = .067$).