Development of a questionnaire to assess lower secondary school students' environmental

citizenship

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Abstract

The aim of this study was to develop and validate a questionnaire to assess lower secondary school students' environmental citizenship. The questionnaire was developed based on the definition of environmental citizenship by the European Network for Environmental Citizenship and it consists of 73 items. A total of 758 Dutch lower secondary school students from fourteen different schools completed the questionnaire. The reliability of the questionnaire was statistically tested via Cronbach's Alpha and Kuder-Richardson Formula 20. Reliability of all seven subscales, except the two knowledge subscales, was found to be high (> .70). Validity of four subscales of the questionnaires was assessed using principal axis factoring. The results show that these four subscales consist of the following four factors: environmental citizenship attitudes, environmental citizenship skills, expression of opinion and considering others. It can be concluded that the first steps in developing an adequate questionnaire to assess lower secondary school students' environmental citizenship have been taken, although further research is needed to develop a fully adequate questionnaire.

Introduction

The world of today is battling numerous environmental problems, such as water and air pollution, global warming and decreasing energy supplies (Lorey, 2002). In order to deal with these complex challenges, a generation of scientifically and politically literate citizens is needed (Hodson, 2003). However, being literate does not necessarily mean that someone will also act responsibly and make thoughtful and well-informed decisions. Citizenship education aims to prepare students to become critical democratic citizens. It is important that students have adequate environmental citizenship (EC) competences to make informed decisions to contribute to a healthy and sustainable environment and society. Therefore, EC should have a prominent position in secondary school science curricula.

Both on the national and international level, the importance of education for EC in science education is acknowledged. On the national level, the Dutch government passed a law in 2006 which requires schools to devote attention to citizenship (Onderwijsraad, 2012). In the 2019-2020 school year, another law might come into effect that clarifies the objectives and the fundamental ideas of citizenship education (Minister voor Basis- en Voortgezet Onderwijs en Media, 2018). Additionally, sustainability is one of the 'karakteristieke denkwijzen' (*'characteristic ways of thinking'*) in the guiding curriculum framework 'Kennisbasis natuurwetenschappen en technologie' (*'Knowledge base science and technology'*) for lower secondary education (Stichting Leerplan Ontwikkeling, 2014). Finally, the national examination programs of biology and chemistry for pre-university and general secondary education include sustainability in specific curriculum goals (such as E3 'Duurzaamheid' (*'Sustainability'*) and F2 'Groene chemie' (*'Green chemistry'*) in the chemistry curriculum, and as a context in which students should be able to reason about for example ecosystems and biodiversity (College voor Toetsen en Examens, 2015a, 2015b, 2016b, 2016a).

On the international level, the Council of Europe developed the Reference Framework of Competences for Democratic Culture, in which the importance of knowledge and critical understanding of the environment and sustainability in citizenship education is stressed (Council of Europe, 2018). In addition, one of the goals in the United Nations' '2030 agenda for sustainable development' (United Nations, 2015) is:

By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development. (United Nations, 2015)

It is clear that the importance of EC in secondary school science is recognized. However, not all teachers feel competent to stimulate students' (environmental) citizenship (Oulton, Day, Dillon, & Grace, 2004). They for example believe it takes too much time or they think they are unable to fit sustainability in the curriculum (Carney, 2011). The results from an exploratory study among 234 pre-service teachers suggest that teachers are more willing to teach about sustainability and the environment if teaching materials, including tools and guidelines, would be accessible (Foley, Archambault, Hale, & Dong, 2017).

The current study is done in the context of a PhD study aiming at developing such tools and guidelines for science teachers to implement EC. The aim of this current study is to develop an adequate instrument to assess secondary school students' EC. EC is difficult to assess for teachers. To our knowledge, no instrument has been developed yet that assesses all components of EC.

Citizenship

Citizenship is becoming increasingly important in education. Since 2006 Dutch schools are required to devote attention to citizenship (Onderwijsraad, 2012). Citizenship relates to politics, democracy and to decisions people make in their daily lives (Veugelers, 2007). It is about giving meaning to life on the personal, interpersonal and socio-political level. A critical-democratic citizen combines individual and social development and participates actively in society (Leenders & Veugelers, 2004). Citizenship education aims to prepare students to become such citizens (Veugelers, 2007). In citizenship education, students participate in discussions, practice decision making and evaluate information (Ratcliffe & Grace, 2003).

Ten Dam, Geijsel, Reumerman, and Ledoux (2010) define citizenship as the ability to act adequately in social situations that occur in daily life. They divide citizenship into four social tasks: (i) acting democratically, (ii) acting in a socially responsible manner, (iii) dealing with conflicts and (iv) dealing with differences. This can for example be in school, in work organizations or in the public domain, but also in peoples' personal lives. Additionally, Ten Dam and colleagues (2010) recognize four components in citizenship: knowledge, attitudes, skills and reflection. The first component – 'knowledge' – includes knowing, understanding and having insight in. This could for example be knowledge about the functioning of a democratic society or about civil rights. 'Attitudes' is about willingness and opinions. Important attitudes for citizenship are respect, tolerance and appreciating differences between people. 'Skills' are about estimating what you are capable of, for example changing perspectives and communicative skills. The final component – 'reflection' – is about being engaged with and thinking about the subject. This component is important for making a critical contribution to society. Ten Dam and colleagues (2010) define what the

ability to adequately fulfill each of these four social tasks assumes for the four components.

Table 1 shows the explanation of the components for each social task.

Table 1. Explanation of the components for each social task in the Ten Dam et al. (2014, p.

Components \rightarrow Social tasks \downarrow	Knowledge	Attitudes	Skills	Reflection
Acting democratically	Knowledge about democracy	Being willing to hear everyone's voices & be willing to make a critical contribution	Standing up for your own opinion & listening to other people's opinions	Thinking about rights and power
Acting in a socially responsible manner	Knowledge about acting in a socially responsible manner	Being willing to help someone else / not to harm them	Showing empathy and understanding for someone else	Thinking about justice
Dealing with conflicts	Knowledge about dealing with conflicts	Being willing to take someone else's point of view seriously	Showing empathy and understanding for someone else	Thinking about the origin and resolution of conflicts
Dealing with differences	Knowledge about dealing with differences	Positive attitude towards differences between people	Adapting to others	Thinking about differences and inclusion and exclusion

12) citizenship questionnaire

Environmental citizenship

Many of today's personal and public issues that citizens need to make decisions about are intertwined with science. These kind of issues are called socio-scientific issues (SSIs) (Sadler, 2009). Opinion forming and value development are important skills in dealing with SSIs (Boerwinkel, Veugelers, & Waarlo, 2009; Ratcliffe & Grace, 2003). Science education can support citizenship education by covering SSIs such as issues related to sustainability, climate change and other environmental problems (Boerwinkel et al., 2009). Based on the 'Knowledge base sciences and technology' (Stichting Leerplan Ontwikkeling, 2014), environmental problems can be summarized in three main categories: climate change due to global warming; extinction of species and loss of ecosystems; and health problems due to polluted air and water. The kind of citizenship focusing on such environmental problems is called 'environmental citizenship' (EC).

Many different interpretations and definitions of EC exist. According to Dobson (2007) the duty of the environmental citizen is "to live sustainably so that others may live well" (p. 282). He says that environmental citizens realize that self-interested behavior is not always good for the common good, in this case the environment. Furthermore, he also claims that EC is both international and intergenerational, because decisions made here and now are likely to have consequences somewhere else and in the future, and environmental citizens understand that private decisions and actions will have public implications.

The components knowledge, attitudes and skills, mentioned by Ten Dam et al. (2010) as three of the four components needed for citizenship, can be recognized in Hawthorne's and Alabaster's (1999) view on EC. They argue that EC can be viewed as "the ultimate outcome of education for sustainability, a process which is all about changing people's attitudes, providing access to knowledge and developing skills which combine to (...) create an environmentally responsible population" (Hawthorne & Alabaster, 1999, p. 26). However, critics are concerned that this view reduces education to an instrument for promoting a specific kind of sustainable environmental behavior (Jickling, 1994). Wals (2010) describes this as a paradox between "a deep concern about the state of the planet" and "a conviction that it is wrong to persuade, influence or even educate people towards pre- and expert-determined ways of thinking and acting" (p. 150).

According to Berkowitz, Ford and Brewer (2005), EC involves both ecological and civics literacy. Ecological literacy is defined as "the ability to use ecological understanding, thinking and habits of mind for living in, enjoying, and/or studying the environment", while civics literacy means "the ability to use an understanding of social (political, economic, etc.)

systems, skills and habits of mind for participating in and/or studying society" (Berkowitz et al., 2005, p. 228). However, literate people will not necessarily act accordingly. To distinguish between those who are willing to put their literacy into action and those who do not, the term environmental citizenship is needed. Berkowitz et al. (2005) define EC as "having the motivation, self-confidence, and awareness of one's values, and the practical wisdom and ability to put one's civics and ecological literacy into action" (p. 228). They also identify knowledge, skills and attitudes as important components of environmental citizenship.

Because the world of today is changing substantially and rapidly and is likely to become increasingly complex, Hodson (2003) advocates that students should be able to recognize that "decisions about scientific and technological development are taken in pursuit of particular interests, and that benefits accruing to some may be at the expense of others" and "that scientific and technological development are inextricably linked with the distribution of wealth and power" (p. 655). He also argues that students should have "an awareness of the complex interactions among, science, technology, society and environment, and a sensitivity to the personal, social and ethical implications of particular technologies" (Hodson, 2003, p. 658). If we apply this to EC, it means that students should have a certain level of knowledge and realization of the complexity of environmental problems.

The definition of EC provided by the European Network for Environmental Citizenship (2018) seems to combine the important elements of the aforementioned definitions and interpretations:

"Environmental Citizenship" is the responsible pro-environmental behaviour of citizens who act and participate in society as agents of change in the private and public sphere, on a local, national and global scale, through individual and collective actions, in the direction of solving contemporary environmental problems, preventing the creation of new environmental problems, achieving sustainability as well as developing a healthy relationship with nature. "Environmental Citizenship" includes the exercise of environmental rights and duties, as well as the identification of the underlying structural causes of environmental degradation and environmental problems, the development of the willingness and the competences for critical and active engagement and civic participation to address those structural causes, acting individually and collectively within democratic means, and taking into account interand intra-generational justice. (ENEC, 2018)

Since this definition is the most complete and detailed definition of EC that we know of, it will be used as a starting point for the definition of EC as assessed in the questionnaire. It contains the same components of citizenship as Ten Dam et al. (2010), save for one: it omits the component reflection. Since reflection is an important component of SSI-based education (Roth & Désautels, 2004), the EC definition from ENEC is complemented with "EC includes being engaged with environmental problems and thinking about your own role in environmental problems."

When dividing the EC definition of ENEC (complemented with the reflection component) into the different components, four conceptual definitions arise, which can be found in Table 2. These four conceptual definitions should be assessed in the EC questionnaire. However, as Berkowitz et al. (2005) pointed out, EC cannot exist without civics literacy. Therefore, four general citizenship attitudes and skills, mentioned by Ten Dam et al. (2010) as parts of the social tasks 'acting democratically' and 'dealing with conflicts', should be assessed in the EC questionnaire as well: (i) being willing to hear everyone's voices; (ii) being willing to take someone else's point of view seriously; (iii) being able to stand up for their own opinion; and (iv) being able to listen to other people's opinions. Finally, students' knowledge of the complexity of environmental problems should

be assessed (Hodson, 2003).

 Table 2. Conceptual definitions of EC per component

Component	Conceptual definition
Knowledge	• A citizen with this knowledge knows how to act and participate in society
	as an agent of change in the private and public sphere, on a local, national and global scale, through individual and collective actions, in the
	direction of solving contemporary environmental problems, preventing
	the creation of new environmental problems, achieving sustainability as
	well as developing a healthy relationship with nature.
	• A citizen with this knowledge can identify the underlying structural
A 1	causes of environmental degradation and environmental problems.
Attitudes	• A citizen with this attitude has the willingness for critical and active
	causes of environmental degradation and environmental problems.
	• A citizen with this attitude has the willingness to act and participate in
	society as agents of change in the private and public sphere, on a local,
	national and global scale, through individual and collective actions, in the
	direction of solving contemporary environmental problems, preventing
	well as developing a healthy relationship with nature
Skills	 A citizen with these skills has the competences for critical and active
	engagement and civic participation to address the underlying structural
	causes of environmental degradation and environmental problems.
	• A citizen with these skills is able to act and participate in society as
	agents of change in the private and public sphere, on a local, national and
	global scale, through individual and collective actions, in the direction of
	solving contemporary environmental problems, preventing the creation of
	developing a healthy relationship with nature
	 A citizen with this knowledge knows how to act individually and
	collectively within democratic means, taking into account inter- and
	intra-generational justice.
Reflection	• A citizen with this reflection is engaged in environmental problems.
	• A citizen with this reflection thinks about his/her role in environmental
	problems.

Existing instruments

Many different questionnaires have been developed to asses EC. Some focus solely on one of the four components, for example on attitudes (Biasutti & Frate, 2017; Bogner & Wilhelm, 1996; Milfont & Duckitt, 2010), and some were developed for different target groups, such as university students (Biasutti & Frate, 2017; Milfont & Duckitt, 2010). Other questionnaires unfortunately cannot be accessed (Maloney & Ward, 1973).

The ROSE questionnaire by Schreiner and Sjøberg (2004) is used for an international comparative research project that studies students' views of science and science education. It consists of almost 250, mostly closed, pre-structured questions. The target group of this questionnaire is fifteen year old students, an age group that is also included in our target group. One section of the questionnaire is called "Me and the environmental challenges". This section seeks to explore to what extent students feel empowered to cope with environmental problems. Empowerment is seen as "a prerequisite for action" and includes "content-specific knowledge and cognitive skills, motivated patterns and personal value orientations" (Schreiner & Sjøberg, 2004, p. 59). Even though Schreiner and Sjøberg (2004) included knowledge as an element of the definition of being empowered, their questionnaire does not assess this component. Some of the questions from this instrument seem useful for the development of the EC questionnaire. This will be discussed in the methods section of this article.

'Burgerschap Meten' (*'Measuring Citizenship'*) by Ten Dam et al. (2014) does assess all four components of citizenship. However, it focusses on citizenship in general, not on EC specifically. The target group of this instrument is children between eleven and sixteen years old, which matches the target group for our questionnaire (lower secondary school students). Even though this questionnaire focusses on citizenship in general instead of EC specifically, it seems an adequate starting point for the development of a questionnaire for EC, because of the inclusion of all of EC's components (knowledge, attitudes, skills and reflection). We therefore decided to use this questionnaire as a starting point and adapt it specifically for the environmental aspects, inspired by the previously mentioned questionnaires and our definition of EC. This will be elaborated on in the methods section.

Outcome

The EC questionnaire will be developed using the questionnaire by Ten Dam et al. (2014) as a starting point. It will be written in Dutch, since the target group for the PhD study, in the context of which this questionnaire will be developed, is Dutch lower secondary school students. The research question that will be addressed is: *What is an adequate questionnaire to assess environmental citizenship in lower secondary school students*?

Methods

Designing the questionnaire

The instrument 'Burgerschap Meten' by Ten Dam et al. (2014) was used as a starting point for the design of the online EC questionnaire. The EC questionnaire consists of 73 items in total, including 7 items about demographic data of the respondent, 1 open question and 65 closed questions. In total, 19 items of the instrument by Ten Dam et al. (2014) were used in the EC questionnaire, either adapted or unadapted (see Table 3). The 'Burgerschap Meten' instrument is written in Dutch, so the items did not need to be translated before being included in the EC questionnaire. Some other items of the EC questionnaire were based on existing questionnaires by Schreiner and Sjøberg (2004) and Milfont and Duckitt (2010) (see Table 3). However, the majority of the items of the EC questionnaire, 46 of them, were newly written, based on our definition of EC and inspired by other questionnaires (e.g. Biasutti & Frate, 2017; Bogner & Wilhelm, 1996) as discussed in the theoretical background.

Item	Questionnaire (item	Questionnaire (item
	literally adopted)	adapted)
26		Milfont & Duckitt, 2010
28		Ten Dam et al., 2014
29		Schreiner & Sjøberg, 2004
30		Ten Dam et al., 2014
31	Ten Dam et al., 2014	
33, 34, 37		Schreiner & Sjøberg, 2004
41, 44, 49		Ten Dam et al., 2014
61 - 63	Ten Dam et al., 2014	
64 - 73		Ten Dam et al., 2014

Table 3. Overview of items and questionnaires they were adapted or adopted from

Validating and improving the questionnaire

In order to improve and validate the questionnaire, a variety of methods was used, including expert consultations, cognitive interviews and a small scale pilot. These will be discussed below.

Expert consultation

As a first step in validating the questionnaire, three experts were consulted: an assistant professor with expertise in sustainability from Utrecht University; a professor with expertise in questionnaires from Utrecht University; and a secondary school teacher with eight years of experience with this study's target group. The experts received the questionnaire via email and were asked to provide feedback, specifically in their field of expertise. The feedback was discussed in one on one meetings. This resulted in the rephrasing of questions and the altering of response categories.

Cognitive interviews

Cognitive interviews with four lower secondary school students were conducted to validate the questionnaire and to get insight into the cognitive processes that take place while the student fills in the questionnaire. The participants were asked to think out loud while filling in the questionnaire, which provides valuable information about for example which questions were misunderstood or which phrasings were too easy or too difficult. To make sure the participants would be capable to put their thoughts into words, verbally strong students were selected for the cognitive interviews by their teacher. The levels and grades of the participants included both extremities of the target group (grade 6 general secondary education (HAVO) and grade 8 pre-university education (VWO)) (see Table 4). Based on the results of the cognitive interviews, the formulation of the items and choice of response categories was determined.

Table 4. Levels and grades of the participants of the cognitive interviews

Participant	Level	Grade
1	HAVO ^a	6
2	HAVO ^a	8
3	VWO ^b	6
4	VWO ^b	8

^aNote: HAVO = general secondary education

^bNote: VWO = pre-university education

Small scale pilot

A small scale pilot was carried out to test whether any unforeseen incidents would take place when students would fill in the questionnaire the same way as they would for the large scale testing. For this pilot, 27 seventh-graders VWO of the Cals College Nieuwegein filled in the questionnaire. No unexpected incidents took place, therefore no alterations were made.

Final questionnaire

The final questionnaire, both the original Dutch version and its English translation, can be found in Appendix A. Translation was done by having someone who was not involved in the research translate the items back to Dutch after we translated them to English. In this way, it could be checked whether translation caused any difference in meaning of the items. Differences that did occur were revised.

The questionnaire is comprised of 7 subscales with a total of 65 items, excluding the demographic data items and one open question on the definition of sustainability. Table 5 provides an overview of the subscales.

Subscale	Label	Number	Example item
		of items	
А	Content knowledge of	8	"The chance that I will notice
	environmental problems (CKEP)		something of climate change is
			very small."
В	Knowledge of complexity of	9	"Problems surrounding
	environmental problems (KCEP)		sustainability are easy to solve."
С	Environmental citizenship	14	"People should be more
	attitudes (ECA)		concerned about protecting the
			environment."
D	Environmental citizenship	15	"How often do you think about
	reflection (ECR)		this? The consequences of
			environmental problems on my
			life."
E	Environmental citizenship skills	7	"I can interact with nature without
	(ECS)		harming it."
F	General citizenship attitudes	7	"People should listen carefully to
	(GCA)		each other, even if they disagree."
G	General citizenship skills (GCS)	6	"In a discussion, I can make clear
			what I think."

Table 5. The names, number of items and an example item per subscale of the EC

questionnaire

In the CKEP subscale, respondents had to indicate which of the answers ('correct', 'incorrect' or 'I don't know') was the best answer to the question. In the KCEP subscale, respondents had to indicate on a 5 point Likert scale, ranging from 'strongly disagree' to 'strongly agree', to what extent they agreed with the items. The option 'I don't know' was included. The response categories of the ECA subscale are the same as for the KCEP subscale, although in this subscale, the option 'I don't know' was not included, since this response category was only considered applicable for knowledge questions. In the ECR subscale, respondents had to indicate how often they discuss or think about certain topics. The response options are 'never', 'once a month', 'once a week', 'once a day' and 'several times a day'. The response categories of the ECS, GCA and GCS subscales are the same as

for the ECA subscale, thus without the option 'I don't know'. Appendix B shows the amount of points given per answer for each item.

Because the different response categories led to multiple item formats in the questionnaire, not all subscales have the same levels of measurement. Subscale A is a dichotomous scale with nominal data, since respondents had to indicate whether a statement was true or false and their answers were either correct or incorrect. In subscale D, respondents had to indicate how often they think or talk about a certain subject. This results in ordinal data. In subscales B, C, E, F, and G respondents had to indicate to what extent they agreed with the statements. Therefore, these subscales can be considered as scale data (Lubke & Muthén, 2009).

Respondents and procedure

For an adequate factor analysis, a minimum of five respondents is needed for every item in a questionnaire (Allen, Kellie, & Heritage, 2014). Since the EC questionnaire consists of 65 items, a minimum of 325 respondents was needed for the large scale testing of the questionnaire. Respondents were acquired by reaching out to secondary school teachers via the researchers' network. In total, 787 students from 14 different schools in the Netherlands filled in the questionnaire. Of these respondents, 29 were lower vocational education (VMBO) students. Their results were excluded because they were not part of the target group of the questionnaire. Thus, the results of 758 respondents were used for analysis, 54.7% females, 44.5% males and 0.8% neither male nor female. Table 6 shows the distribution of the respondents over the two levels (HAVO and VWO) and the three grades (sixth, seventh and eight).

	Grade 6	Grade 7	Grade 8	Total	
HAVO	71	48	88	207	
VWO	146	238	167	551	
Total	217	286	255	758	

Table 6. Distribution of respondents over the different grades (6 to 8) and levels (HAVO andVWO)

The questionnaire was administered digitally to the students via the online forms management system Formdesk (<u>https://nl.formdesk.com/</u>). The URL to the questionnaire was sent to the teachers. They administered the questionnaire in their classes or forwarded the URL directly to their students. A concise teacher instruction was added that requested the teachers not to interfere with their students while they were filling in the questionnaire. In case the students had questions regarding the questionnaire, the teacher was asked to tell the students that they could fill in the answer they thought was most suitable. It took the students approximately fifteen to twenty minutes to complete the questionnaire.

Statistical data analysis

All data analyses were performed using IBM SPSS Statistics 25. Appendix C shows how data analyses were performed in SPSS Statistics.

Factor analysis

Factor analysis was carried out to investigate the underlying structure of the questionnaire. Subscales A and D were excluded from factor analysis, because they do not have scale data. Factor analysis in SPSS treats the variables as if they are scale data. This makes conducting a factor analysis with non-scale data prone to problems (Gorsuch, 1983). Therefore, it was decided to omit the items from these subscales from factor analysis.

The items of subscales B, C, E, F and G were subjected to principal axis factoring (PAF) with direct oblimin rotation. PAF was chosen, because this method is most commonly

used for uncovering the structure of an underlying set of variables (Allen et al., 2014). The Kaiser criterion (Kaiser, 1960), scree plots and factor interpretability were used to determine the number of factors. Factor loadings of .30 or higher were considered acceptable (Allen et al., 2014)

Reliability

For testing the internal consistency reliability of the subscales with scale or ordinal data (subscales B to G), Cronbach's α was determined. Because of the dichotomous data, Kuder-Richardson Formula 20 (KR-20) was determined to test the reliability of subscale A. General consensus is that internal consistency coefficients (such as KR-20 or Cronbach's α) of in the region of .70 or higher are acceptable (Bradley, 1994; Salkind, 2010).

Results

To test the quality of the questionnaire, factor analysis and reliability analysis were conducted.

Factor analysis

Factor analysis of the items with scale data (subscales B, C, E, F and G) resulted in a correlation matrix that showed low correlations (nearly all below .30) between the items of subscale B with the items of all other subscales. This indicates that it is unlikely that there is any underlying structure (Allen et al., 2014). Additionally, a pattern matrix could not be constructed, because rotation failed to converge in 25 iterations. Therefore, it was decided to drop the items of subscale B from the factor analysis.

After dropping the items from subscale B and rerunning the factor analysis, a pattern matrix could be constructed (see Table 7). Additionally, a KMO value of .93 and the significance level of the Bartlett's test of Sphericity (p < .001) indicated that the data was suitable for factor analysis (Allen et al., 2014). Considering factors with eigenvalues equal or superior to one, five factors were identified as underlying the 34 items. In total, these factors accounted for around 46% of the variance in the questionnaire data. However, the scree plot suggested two factors could be extracted (see Figure 1), thus we examined this solution as well. It was found that two factors accounted for only 36% of the variance. Because of this lower percentage and because the five-factor solution represented the intended subscales better, it was decided to use the five-factor solution for further investigation of the scale.

Table 7. First factor loadings items subscales C, E, F and G of the EC questionnaire

Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
C27) I think it is important that we take	.519	.245	.008	.050	.066
good care of nature.					

Item	Factor	Factor	Factor	Factor	Factor
	1	2	3	4	5
F62) In a discussion, everyone must be	.495	114	.332	.007	.220
given the opportunity to say something.					
F61) People should listen carefully to	.492	033	.306	.082	.113
each other, even if they disagree.					
F63) If someone in class disagrees with	.482	163	.405	.095	.169
something, he/she should be given the					
opportunity to explain it.					
C31) When I have had a picnic with	.463	.033	.089	.085	.123
friends in the park, it is normal for us to					
clean up the mess.					
C37) People worry too much about	.353	.240	.011	012	006
environmental problems.					
E59) I know how to separate waste.	.254	041	.064	.195	.186
C28) I would like to talk to others about	114	.715	.051	.051	.056
environmental problems.					
C32) I would like to learn how	066	.707	.090	091	.007
environmental problems arise.					
C25) I would like to be involved in	016	.681	.034	.060	.051
devising solutions to environmental					
problems.					
C26) I would like to become a member	036	.679	.011	.053	056
of an organization that protects the					
environment.	10.		0.40	o (-	
C36) I would like to learn how I can	.192	.656	.040	047	.023
live more sustainably.			074	0.40	
C33) I am willing to give up certain	.120	.565	.054	.060	029
things so that environmental problems					
can be solved.	1.7.4	= < 4	0.4.1	000	000
C35) I sometimes ask my	174	.564	.041	.098	.030
parents/guardians about their choices in					
the field of sustainability.	200	506	002	000	020
C30) I think it is important that children	.296	.530	.003	.008	.030
and young people dedicate themselves					
to a sustainable world.	100	4.40	025	107	052
C38) I am willing to buy more	.189	.442	035	.137	053
expensive items if they are better for the					
environment. C_{24} Deeple should be more concerned.	270	202	020	011	120
about protocting the environment	.319	.373	029	.011	.120
(C20) Environmental problems are not	202	202	006	042	010
wy problem	.303	.303	.090	.043	.010
my problem.					

Item	Factor	Factor	Factor	Factor	Factor
	1	2	3	4	5
G71) I can let others finish their	.025	070	.728	003	013
sentences.					
G72) I can listen to the reasons why	.000	.029	.713	030	.166
others choose something else.					
F64) In a discussion I try to take the	.219	051	.667	.046	.059
other person seriously.					
G73) I can understand how someone	062	004	.600	.089	.124
else thinks.					
F65) If I notice that I am wrong, I am	102	.121	.560	.056	178
willing to admit that.					
F67) In a discussion, I am willing to	.143	.124	.538	034	.088
find a solution that we can both be					
satisfied with.					
F66) In a discussion, I want to find out	049	.178	.529	.033	.052
what we agree about and where we					
differ from opinion.					
E55) I can judge whether a source with	116	063	022	.700	038
information about sustainability is					
reliable.	0.4.4				0.0.4
E60) When I hear something about	066	.039	.034	.642	006
sustainability, I know how to find out if					
it is true or not.	0.4.1	110	0.62	= - 1	006
E57) I can name sustainable alternatives	041	.119	.063	.521	.006
for non-sustainable energy sources.	240	051	046	450	0.20
E56) I can interact with nature without	.240	051	.046	.473	.029
narming it.	049	002	027	100	005
E58) I know how to find out if a	.048	.082	037	.408	.095
lunchox is better for the environment					
than a plastic dag. $E(54)$ Lean behave environmentally	227	027	077	400	054
E34) I can behave environmentary	.221	.057	.077	.400	.034
Consciously.	046	006	040	027	Q 7 1
if Low really right	040	.000	.040	027	.0/1
II I all Itally light.	075	050	040	010	<u>8</u> /9
G(0) i can static up for my opinion. G(6) in a discussion. I can make clear	073	.050	040 022	.019	.040 762
what I think	.012	013	.023	.040	./02
what I think.					

Note: values equal and superior to .30 are printed in bold to improve readability and

interpretability of the table.



Figure 1. Scree plot principal axis factoring subscales C, E, F and G of the EC questionnaire

In the first factor, five items from subscale C and three items from subscale F are combined (see Table 7). However, the items from subscale F (items 61, 62 and 63) have cross-loadings on factor 3, which indicates that these items measure several concepts. Given this fact, it was decided to drop these items. Additionally, items 34 and 29 (from subscale C) were dropped because of cross-loadings on factor 2. Factor 2 consists of the remaining 9 items of subscale C. Factor 3 contains four items from subscale F (excluding items 61, 62 and 63) and three items from subscale G, resulting in a total of seven items. No cross-loadings occurred in these items. Six of the seven items of subscale E are combined in factor 4 without any cross-loadings. The seventh item of this subscale (item 59) has low loadings on all factors (< .30) and was therefore dropped. The three remaining questions of subscale G are combined in factor 5 without any cross-loadings.

After dropping items with cross-loadings or loadings below .30 (a total of six items), factor analysis was re-run again. Again, five factors were identified, underlying the remaining 28 items. Now, item 30 has cross-loadings on factor 1 and 5. Therefore, this item was dropped as well and factor analysis was run once more. This resulted in a pattern matrix in which no cross-loadings occurred and all items loaded highly on one of the five factors. Factor 1 contained only items from subscale C. Factor 2 consisted of three items from subscale G. In factor 3, items from subscales F and G were combined. Factor 4 contained only items from subscale E and factor 5 contained three items of subscale C. To improve interpretability of the factors, items 27, 31 and 37 were deleted, as they were not intended as a separate factor. The final factor analysis that was run then resulted in a four-factor solution that explained 46% of the variance (see Table 8). Since these remaining four factors were in general consistent with the intended subscales (apart from factor 1 in which items from subscales F and G are combined), it was decided to continue with these final results. Thus we selected 24 of the original 34 items of subscales C, E, F and G (subscales ECA, ECS, GCA and GCS respectively).

Table 8. Final factor loadings items from subscales C, E, F and G of the EC questionnaire

Item	Factor	Factor	Factor	Factor
	1	2	3	4
G71) I can let others finish their sentences.	.774	024	106	009
G72) I can listen to the reasons why others choose	.759	.151	014	037
something else.				
F64) In a discussion I try to take the other person	.682	.119	005	.053
seriously.				
G73) I can understand how someone else thinks.	.617	.094	047	.088
F67) In a discussion, I am willing to find a	.561	.117	.151	040
solution that we can both be satisfied with.				
F65) If I notice that I am wrong, I am willing to	.558	209	.069	.046
admit that.				
F66) In a discussion, I want to find out what we	.519	.026	.158	.026
agree about and where we differ from opinion.				
G69) I can hold on to my own opinion if I am	.072	.835	017	011
really right.				
G70) I can stand up for my opinion.	021	.807	.025	.036
G68) In a discussion, I can make clear what I	.049	.752	020	.067
think.				
C32) I would like to learn how environmental	.019	015	.754	129
problems arise.				
C28) I would like to talk to others about	027	.017	.751	.014
environmental problems.				

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Item	Factor	Factor	Factor	Factor
	1	2	3	4
C26) I would like to become a member of an	033	075	.703	.025
organization that protects the environment.				
C36) I would like to learn how I can live more	.062	.072	.701	072
sustainably.				
C25) I would like to be involved in devising	.015	.030	.678	.039
solutions to environmental problems.				
C33) I am willing to give up certain things so that	.054	.004	.602	.038
environmental problems can be solved.				
C35) I sometimes ask my parents/guardians about	020	022	.555	.069
their choices in the field of sustainability.				
C38) I am willing to buy more expensive items if	002	003	.479	.115
they are better for the environment.				
E55) I can judge whether a source with	042	064	087	.698
information about sustainability is reliable.				
E60) When I hear something about sustainability,	.034	034	001	.655
I know how to find out if it is true or not.				
E57) I can name sustainable alternatives for non-	.041	.001	.119	.524
sustainable energy sources.				
E56) I can interact with nature without harming it.	.102	.112	.011	.446
E58) I know how to find out if a lunchbox is	021	.104	.091	.407
better for the environment than a plastic bag.				
E54) I can behave environmentally consciously.	.119	.133	.110	.364

Note: values equal or superior to .30 are printed in bold to improve readability and interpretability of the table.

Given the discrepancy between the division of subscales F (GCA) and G (GCS) and the factors that resulted from the factor analysis, it was decided to change the distribution of these subscales to follow the factors. This means that one subscale will now consist of items 64 to 67 and 71 to 73 and will be labeled 'Considering others'. The other new subscale contains items 68, 69 and 70 and will be labeled 'Expression of opinions'. Subscales C (ECA) and E (ECS) were already consistent with the factors (factors 3 and 4 respectively), so no changes will be made there. Descriptive statistics and Cronbach's alphas of these four factors are reported in Table 9.

Factor	Ν	M	SD	α	
Considering others	7	3.66	.68	.85	
Expression of	3	4.07	.80	.86	
opinion					
EC attitudes	8	3.08	.71	.86	
EC skills	6	3.40	.60	.73	

Table 9. Mean (M), standard deviation (SD) and Cronbach's alpha (reliability) of the four

factors

Subscale B ('Knowledge of complexity of environmental problems')

As mentioned before, the items from subscale B were dropped from factor analysis because of low correlations and because a pattern matrix could not be constructed. However, after conducting a factor analysis for just the items of subscale B, a pattern matrix could be constructed (see Table 10). The KMO value is .67 and the Bartlett's test of Sphericity is significant (p < .001). Three factors were identified as underlying the nine items, taking into account factors with eigenvalues equal or superior to one. These accounted for 27% of the variance in the questionnaire data.

As can be seen in Table 10, no cross-loadings have occurred. Items 18 and 19 have low loadings (< .30) on all three factors. It was therefore decided to drop item 18. Item 19 was not dropped, because this item was considered a valuable supplement to factor 2 and its loading on this factor was close to .30 (.27). Therefore, factor 1 (labeled 'Causes of environmental problems') consists of items 21, 23 and 24; factor 2 (labeled 'Complexity of environmental problems') of items 16, 19 and 20; and factor 3 (labeled 'Relevance of sustainability') of items 17 and 22.

Even though subscale B could be divided into three factors, it was decided to keep all items together in one subscale, given the small amount of items per factor.

Item	Factor	Factor	Factor
	1	2	3
B24) Environmental problems exist because people have	.645	.001	128
different norms and values.			
B21) Environmental problems exist because there are	.562	027	.008
different interests.			
B23) Environmental problems are caused by inequality in	.420	032	.165
the world.			
B18) If everyone thought sustainability was important, we	.262	.025	.102
would not have environmental problems now.			
B20) Environmental problems are complicated.	017	778	.118
B16) Environmental problems are complex.	.258	328	044
B19) Problems surrounding sustainability are easy to solve.	.203	.270	.201
B17) Everybody finds sustainability important.	.019	078	.453
B22) Companies always opt for the sustainable solution.	012	.037	.405

Table 10. Factor loadings items from su	ubscales B of the EC questionnaire
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Note: values equal or superior to .30 (both negative and positive) are printed in bold to

improve readability and interpretability of the table.

Reliability of subscale A, B and D

Descriptive statistics and internal consistency reliabilities of subscales A (CKEP), B

(KCEP) and D (ECR) can be found in Table 11.

Table 11. Mean (M), standard deviation (SD) and Cronbach's alpha (reliability) for

subscales A, B and D

Subscale	Ν	М	SD	Reliability
A (CKEP)	8	.66	.17	.47 ^a
B (KCEP)	9	4.38	.49	.52 ^b
D (ECR)	15	2.18	.79	.93 ^b

^aNote: reliability coefficient of subscale A is KR-20.

 $^bNote:$ reliability coefficient of subscale B and D is Cronbach's $\alpha.$

Discussion

The goal of this study was to develop an adequate questionnaire for measuring lower secondary school students' environmental citizenship. A definition of EC and the components it comprised were derived from literature and conceptual definitions per component were developed (see Table 1). We have investigated the suitability of this questionnaire for its use in a Dutch lower secondary school setting.

The results show that the first few steps in the development of an adequate questionnaire have been taken. Empirical support has been found for the construct validity of two of the original subscales of the questionnaire, being subscale C ('EC attitudes') and subscale E ('EC skills'). Additionally, two new subscales ('Expression of opinion' and 'Considering others') have been constructed out of the two original subscales F ('General citizenship attitudes') and G ('General citizenship skills'). Finally, it was shown that the reliability of these four subscales and subscale D ('EC reflection') was high.

However, further research will be necessary to provide a fully valid and reliable questionnaire. Due to the non-scale data of subscales A ('Content knowledge of environmental problems') and D, factor analysis could not be performed on these subscales using SPSS Statistics. Therefore, these subscales were not completely validated. Analysis with a different software environment (for example R) will be necessary to determine the factor structures of these subscales. Additionally, the items of subscale B ('Knowledge of complexity of environmental problems') had to be dropped from factor analysis because of their low correlations with the items of the other subscales. To improve the validity of subscale B, items need to be evaluated critically and rewriting of items or development of new items will be necessary. After revising the items of this subscale, factor analysis needs to be performed again to verify the validity of the subscale. Factor analysis of only the items of subscale B showed that this subscale could be divided into three factors, namely 'Causes of environmental problems', 'Complexity of environmental problems' and 'Relevance of sustainability'. However, given the small number of items per factor (either two or three), it was decided to keep all items together in one subscale instead of splitting them up into three different subscales. Nonetheless, it should be acknowledged that this subscale possibly assesses three different constructs.

It can be concluded that the variety of item formats and the resulting different measurement levels made statistical data analysis complicated. Fellow researchers are advised to use a single item format for the development of a questionnaire to increase analyzability.

Internal consistency reliabilities of the two knowledge subscales (subscales A and B) were low, which means that the items within each subscales are weakly correlated and presumably do not measure a single, one-dimensional latent construct. However, it could be argued that low reliability for these subscales is not problematic. It is possible that students know some facts about environmental problems, whilst not knowing others. This differs from the other components (attitudes, skills and reflection), because more coherence is expected within these components. Knowledge can be judged as either right or wrong. However, attitudes, skills and reflection do not have these strict resolutions. Therefore, knowledge is a different kind of component. As a result, it could be questioned whether the reliability of the knowledge subscales is relevant, although in literature, analyzing the reliability of knowledge scales is not uncommon (Fitzgerald et al., 1998; Kabakci Yurdakul et al., 2012; Sapp & Jensen, 1997).

The completed questionnaires provide insight into the respondents' level of environmental citizenship. Table 9 and 11 show the respondents' mean levels for each subscale. Take note that for the subscales B (KCEP), C (ECA), D (ECR), E (ECS), 'Considering others' and 'Expression of opinion', a maximum of five points can be received per answer, while for subscale A (CKEP), the maximum amount of points is two. In almost all subscales respondents' mean scores are above middle, which means they answered most questions in favor of a high level of EC. Respondents score best on subscale B (4.38), which assesses their knowledge of the complexity of environmental problems. This implies that in general, students know how complex environmental problems can be. The mean score of subscale D is below middle (2.18). This shows that there is still room for improvement in this subscale. In educational practice, more attention could be payed to students' reflection regarding EC.

The questionnaire is developed for Dutch lower secondary school students. However, it might also be suitable for different target groups. To determine whether this is the case, further research will be necessary. Possibly, changes might have to be made, because the instrument is based on the Dutch attainment targets of lower secondary school. The knowledge component could for example be extended for the use of the questionnaire in higher secondary school.

The questionnaire has the potential to fill the knowledge gap regarding lower secondary school students' level of EC. In educational practice, it could help teachers make EC assessable. The EC questionnaire could also be useful for evaluating the effectiveness of interventions aimed at implementing EC in the classroom. As a results, effective tools and guidelines might increase teachers willingness and feeling of competence to stimulate students' EC (Foley et al., 2017). The EC questionnaire is an addition to existing questionnaires in that it assesses all components of EC in one questionnaire.

The aim of this study was to develop an adequate questionnaire to assess lower secondary school students' environmental citizenship, which is a difficult concept to assess for teachers. In order to reach this aim, we designed a questionnaire that assesses EC as defined by ENEC (2018) supplemented by the components EC reflection, general citizenship attitudes and general citizenship skills. This questionnaire was validated and subsequently administered to 758 lower secondary school students. Statistical data analysis was carried out to investigate the underlying structure of the questionnaire and to determine the reliability of the questionnaire. Hereby, the first steps to making students' EC assessable for teachers have been taken.

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Appendix A

The original (D	Outch) version of t	he questionnaire and	the English translation.

Subscale	Response categories	Item	Original (Dutch) wording	English translation
		number		
A (CKEP)	Correct / Incorrect / I	8	De kans dat ik iets ga merken van	The chance that I will notice something of
	don't know		klimaatverandering is zeer klein.	climate change is very small.
		9	De CO2-uitstoot in Nederland is aan het	CO ₂ emissions in the Netherlands are
			afnemen.	decreasing.
		10	Het aantal dieren in het wild is de	The number of wild animals has decreased
			afgelopen 50 jaar meer dan 50%	more than 50% in the last 50 years.
			afgenomen.	
		11	Er zijn nog nergens op de wereld	Environmental problems aren't noticeable yet
			milieuproblemen merkbaar.	anywhere in the world.
		12	Luchtvervuiling heeft invloed op de gezondheid van de mens.	Air pollution influences human health.
		13	Het is duurzamer om met het vliegtuig	It is more sustainable to go to Paris by plane
			naar Parijs te gaan dan met de trein.	than by train.
		14	De wereldwijde CO2-uitstoot is aan het	Global CO ₂ emissions are decreasing.
			afnemen.	
		15	In andere delen van de wereld zijn er geen milieuproblemen.	In other parts of the world, there are no environmental problems.
B (KCEP)	Strongly disagree /	16	Milieuproblemen zijn complex.	Environmental problems are complex.
	Disagree / Neither	17	Iedereen vindt duurzaamheid belangrijk.	Everybody finds sustainability important.
	agree nor disagree /	18*	Als iedereen duurzaamheid belangrijk	If everyone thought sustainability was
	Agree / Strongly		zou vinden, dan hadden we nu geen	important, we would not have environmental
	agree / I don't know		milieuproblemen.	problems now.

2	0
Э	0

Subscale	Response categories	Item number	Original (Dutch) wording	English translation
		19	Problemen rondom duurzaamheid zijn makkelijk op te lossen.	Problems surrounding sustainability are easy to solve.
		20	Milieuproblemen zijn ingewikkeld.	Environmental problems are complicated.
		21	Milieuproblemen bestaan omdat er verschillende belangen zijn.	Environmental problems exist because there are different interests.
		22	Bedrijven kiezen altijd voor de duurzame oplossing.	Companies always opt for the sustainable solution.
		23	Milieuproblemen worden veroorzaakt door ongelijkheid in de wereld.	Environmental problems are caused by inequality in the world.
		24	Milieuproblemen bestaan omdat mensen verschillende normen en waarden hebben.	Environmental problems exist because people have different norms and values.
C (ECA)	Strongly disagree / Disagree / Neither agree nor disagree /	25	Ik wil graag betrokken zijn bij het bedenken van oplossingen voor milieuproblemen.	I would like to be involved in devising solutions to environmental problems.
	Agree / Strongly agree	26	Ik zou graag lid willen worden van een organisatie die het milieu beschermt.	I would like to become a member of an organization that protects the environment.
	0	27*	Ik vind het belangrijk dat we goed voor de natuur zorgen.	I think it is important that we take good care of nature.
		28	Ik wil graag met anderen praten over milieuproblemen.	I would like to talk to others about environmental problems.
		29*	Milieuproblemen zijn niet mijn probleem.	Environmental problems are not my problem.
		30*	Ik vind het belangrijk dat kinderen en	I think it is important that children and young
			jongeren zich inzetten voor een duurzame wereld.	people dedicate themselves to a sustainable world.

2	0
Э	9

Subscale	Response categories	Item number	Original (Dutch) wording	English translation
		31*	Als ik met vrienden in het park een picknick heb gehad, is het normaal dat we de rommel opruimen.	When I have had a picnic with friends in the park, it is normal for us to clean up the mess.
		32	Ik wil graag leren hoe milieuproblemen ontstaan.	I would like to learn how environmental problems arise.
		33	Ik ben bereid om bepaalde dingen op te geven zodat milieuproblemen opgelost kunnen worden.	I am willing to give up certain things so that environmental problems can be solved.
		34*	Mensen zouden zich meer zorgen moeten maken om het beschermen van het milieu.	People should be more concerned about protecting the environment.
		35	Ik vraag mijn ouders/verzorgers wel eens naar hun keuzes op het gebied van duurzaamheid.	I sometimes ask my parents/guardians about their choices in the field of sustainability.
		36	Ik wil graag leren hoe ik duurzamer kan leven.	I would like to learn how I can live more sustainably.
		37*	Mensen maken zich te druk om milieuproblemen.	People worry too much about environmental problems.
		38	Ik ben bereid om duurdere spullen te kopen als die beter zijn voor het milieu.	I am willing to buy more expensive items if they are better for the environment.
D (ECR)	Never / Once a	39	Milieuproblemen.	Environmental problems.
	month / Once a week / Once a day /	40	De gevolgen van milieuproblemen op mijn leven.	The consequences of environmental problems on my life.
	Several times a day	41	Hoe ik kan zorgen dat er iets verandert in mijn buurt op het gebied van duurzaamheid.	How I can ensure that something changes in my neighborhood in terms of sustainability.

Subscale	Response categories	Item	Original (Dutch) wording	English translation
		number		
		42	Hoe het komt dat het klimaat verandert.	What causes that the climate is changing.
		43	Hoe vuile lucht en vuil water zorgen voor gezondheidsproblemen.	How polluted air and water cause health problems.
		44	Hoe ik kan zorgen dat er iets verandert in	How I can ensure that something changes in
			Nederland op het gebied van duurzaamheid.	the Netherlands in the field of sustainability.
		45	Hoe het komt dat soorten (dieren, planten	What causes that species (animals, plants
			en/of schimmels) uitsterven.	and/or fungi) go extinct.
		46	De gevolgen van milieuproblemen in de toekomst.	The consequences of environmental problems in the future.
		47	Wat ik kan doen om nieuwe	What I can do to prevent new environmental
			milieuproblemen te voorkomen.	problems.
		48	Hoe ik op een gezonde manier met de natuur kan omgaan.	How I can interact with nature in a healthy way.
		49	Hoe ik kan zorgen dat er iets verandert in de wereld op het gebied van duurzaamheid.	How I can ensure that something changes in the world in terms of sustainability.
		50	Thuis hebben we het over onze	At home we discuss our influence on the
			invloed op het milieu.	environment
		51	Thuis hebben we het over duurzaamheid.	At home we discuss sustainability
		52	Met mijn vrienden heb ik het over onze invloed op het milieu.	With my friends, I discuss our influence on the environment
		53	Met mijn vrienden heb ik het over duurzaamheid.	With my friends, I discuss sustainability
E (ECS)	Strongly disagree /	54	Ik kan mij milieubewust gedragen.	I can behave environmentally consciously.

DEVELOPMENT OF A QUESTIONNAIRE TO ASSESS EC

Subscale	Response categories	Item number	Original (Dutch) wording	English translation
	Disagree / Neither agree nor disagree / Agree / Strongly	55	Ik kan inschatten of een bron met informatie over duurzaamheid betrouwbaar is.	I can judge whether a source with information about sustainability is reliable.
	agree	56	Ik kan omgaan met de natuur zonder de natuur daarbij te schaden	I can interact with nature without harming it.
		57	Ik kan duurzame alternatieven benoemen voor niet-duurzame energiebronnen.	I can name sustainable alternatives for non- sustainable energy sources.
		58	Ik weet hoe ik kan uitzoeken of een broodtrommel beter is voor het milieu dan een plastic zakje.	I know how to find out if a lunchbox is better for the environment than a plastic bag.
		59*	Ik weet hoe ik afval moet scheiden.	I know how to separate waste.
		60	Als ik iets over duurzaamheid hoor, weet ik hoe ik kan uitzoeken of het waar is of niet.	When I hear something about sustainability, I know how to find out if it is true or not.
F (GCA)	Strongly disagree / Disagree / Neither agree nor disagree /	61*	Mensen moeten goed naar elkaar luisteren, ook al verschillen ze van mening.	People should listen carefully to each other, even if they disagree.
	Agree / Strongly agree	62*	In een discussie moet iedereen de kans krijgen om iets te zeggen.	In a discussion, everyone must be given the opportunity to say something.
	U	63*	Als iemand in de klas het ergens mee oneens is, moet hij/zij de kans krijgen om dat uit te leggen.	If someone in class disagrees with something, he/she should be given the opportunity to explain it.
		64 ^b	In een discussie probeer ik de ander serieus te nemen.	In a discussion I try to take the other person seriously.
		65 ^b	Als ik merk dat ik ongelijk heb, dan wil ik dat wel toegeven.	If I notice that I am wrong, I am willing to admit that.

Subscale	Response categories	Item	Original (Dutch) wording	English translation
		number		
		66 ^b	In een discussie wil ik uitzoeken waarover we het eens zijn en waarover we van mening verschillen.	In a discussion, I want to find out what we agree about and where we differ from opinion.
		67 ^b	In een discussie ben ik bereid een oplossing te zoeken waar we allebei tevreden mee kunnen zijn.	In a discussion, I am willing to find a solution that we can both be satisfied with.
G (GCS)	Strongly disagree / Disagree / Neither	68 ^a	Ik kan in een discussie duidelijk maken wat ik vind.	In a discussion, I can make clear what I think.
	agree nor disagree / Agree / Strongly	69 ^a	Ik kan vasthouden aan mijn eigen mening als ik echt gelijk heb.	I can hold on to my own opinion if I am really right.
	agree	70^{a}	Ik kan opkomen voor mijn mening.	I can stand up for my opinion.
		71 ^b	Ik kan anderen uit laten spreken.	I can let others finish their sentences.
		72 ^b	Ik kan luisteren naar de redenen waarom anderen iets anders kiezen.	I can listen to the reasons why others choose something else.
		73b	Ik kan snappen hoe een ander denkt.	I can understand how someone else thinks.

*Note: these items were omitted from the final analysis.

^aNote: after final analysis, these items were combined into the new scale 'Expression of opinion'.

^bNote: after final analysis, these items were combined into the new scale 'Considering others'.

Appendix B

Overview of the amount of points given per answer

Table B1. The amount of points given per answer for each item in subscale A

Item	Correct	Incorrect	I don't
			know
8	0	1	0
9	1	0	0
10	1	0	0
11	0	1	0
12	1	0	0
13	0	1	0
14	0	1	0
15	0	1	0

Table B2. The amount of points given per answer for each item in subscale B

Item	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	I don't know
16	1	2	3	4	5	1
17	5	4	3	2	1	1
18	5	4	3	2	1	1
19	5	4	3	2	1	1
20	1	2	3	4	5	1
21	1	2	3	4	5	1
22	5	4	3	2	1	1
23	1	2	3	4	5	1
24	1	2	3	4	5	1

Table B3. The amount of points given per answer for each item in subscales C, E, F and G

Item	Strongly disagree	Disagree	Neither agree	Agree	Strongly agree
			disagree		
25	1	2	3	4	5
26	1	2	3	4	5
27	1	2	3	4	5
28	1	2	3	4	5
29	5	4	3	2	1
30	1	2	3	4	5
31	1	2	3	4	5
32	1	2	3	4	5
33	1	2	3	4	5

Item	Strongly	Disagree	Neither	Agree	Strongly
	disagree		agree		agree
			nor		
			disagree		
34	1	2	3	4	5
35	1	2	3	4	5
36	1	2	3	4	5
37	5	4	3	2	1
38	1	2	3	4	5
54	1	2	3	4	5
55	1	2	3	4	5
56	1	2	3	4	5
57	1	2	3	4	5
58	1	2	3	4	5
59	1	2	3	4	5
60	1	2	3	4	5
61	1	2	3	4	5
62	1	2	3	4	5
63	1	2	3	4	5
64	1	2	3	4	5
65	1	2	3	4	5
66	1	2	3	4	5
67	1	2	3	4	5
68	1	2	3	4	5
69	1	2	3	4	5
70	1	2	3	4	5
71	1	2	3	4	5
72	1	2	3	4	5
73	1	2	3	4	5

Table B4. The amount of points given per answer for each item in subscale D

Item	Never	Once a	Once a	Once a	Several
		month	week	day	times a
					day
39	1	2	3	4	5
40	1	2	3	4	5
41	1	2	3	4	5
42	1	2	3	4	5
43	1	2	3	4	5
44	1	2	3	4	5
45	1	2	3	4	5
46	1	2	3	4	5
47	1	2	3	4	5
48	1	2	3	4	5
49	1	2	3	4	5
50	1	2	3	4	5
51	1	2	3	4	5
52	1	2	3	4	5
53	1	2	3	4	5

Appendix C

Data file

"Data EC questionnaire.sav"

Explanation of the variables in this data file

D1 to D4, D6 and D7: items 1 to 4, 6 and 7 (demographic questions and open question (not

used for statistical data analysis))

D5: string variable of item 5 "Welk niveau doe je?"

S1_8 to S1_15: string variables of items 8 to 15 from subscale A

S2_16 to S2_24: string variables of items 16 to 24 from subscale B

S3_25 to S3_38: string variables of item s25 to 38 of subscale C

S4a_39 to S4a_49: string variables of items 39 to 49 of subscale D (items were the question

"Hoe vaak denk jij hierover na?" are answered)

S4b_50 to S4b_53: string variables of items 50 to 53 of subscale D (items were the question

"Vul in wat er op de puntjes moet komen" are answered)

S5_54 to S5_60: string variables of items 54 to 60 of subscale E

S6_61 to S6_67: string variables of items 61 to 67 of subscale F

S7_68 to S7_73: string variables of items 68 to 73 of subscale G

N_D_5: numeric variable of item 5 "Welk niveau doe je?"

N_S1_8 to N_S1_15: numeric variables of items 8 to 15 from subscale A

N_S2_16 to N_S2_24: numeric variables of items 16 to 24 from subscale B

N_S3_25 to N_S3_38: numeric string variables of items 25 to 38 of subscale C

N_S4a_39 to N_S4a_49: numeric variables of items 39 to 49 of subscale D (items were the

question "Hoe vaak denk jij hierover na?" are answered)

N_S4b_50 to N_S4b_53: numeric variables of items 50 to 53 of subscale D (items were the question "Vul in wat er op de puntjes moet komen" are answered)

N_S5_54 to N_S5_60: numeric variables of items 54 to 60 of subscale E

N_S6_61 to N_S6_67: numeric variables of items 61 to 67 of subscale F

N_S7_68 to N_S7_73: numeric variables of items 68 to 73 of subscale G

Data analysis

Excluding VMBO students from the analyses

 $Data > Select \ Cases > If \ condition \ is \ satisfied > If > N_D_5 = 1 > Continue > OK$

Factor analysis subscales B, C, E, F and G

Analyze > Dimension reduction > Factor

Variables: N_S2_16 to N_S3_38 and N_S5_54 to N_S7_73

Descriptives > Initial solution, Coefficients, Significance levels, Determinant, KMO and

Bartlett's test of sphericity, Anti-image > Continue

Extraction > Method: Principal axis factoring, Correlation matrix, Unrotated factor solution,

Scree plot, Based on Eigenvalue, Eigenvalue greater than: 1, Maximum Iterations for

Convergence: 25 > Continue

Rotation > Direct Oblimin, Rotated solution, Loading plot(s), Maximum Iterations for

Convergence: 25 > Continue

Scores > Display factor score coefficient matrix > Continue

Options > Exclude cases listwise, Sorted by size, Suppress small coefficients, Absolute value

below: .30 > Continue

OK

Output file: "Output_02062019" \rightarrow Factor Analysis 1

Factor analysis subscales C, E, F and G

Same as "Factor analysis subscales B, C, E, F and G", but with different variables.

Variables: N_S3_25 to N_S3_38 and N_S5_54 to N_S7_73

Output file: "Output_02062019" \rightarrow Factor Analysis 2

Factor analysis subscales C, E, F and G (fixed number of factors)

Same as "Factor analysis subscales C, E, F and G", but with different settings in 'Extraction'. Extraction > Method: Principal axis factoring, Correlation matrix, Unrotated factor solution, Scree plot, Fixed number of factors, Factors to extract: 2, Maximum Iterations for

Convergence: 25 > Continue

Output file: "Output_02062019" → Factor Analysis 2 gedwongen 2 factoren

Factor analysis subscales C, E, F and G (items 29, 34, 59, 61, 62 and 63 dropped)

Same as "Factor analysis subscales B, C, E, F and G", but with different variables.

Variables: N_S3_25 to N_S3_38 and N_S5_54 to N_S7_73, but without items N_S3_29,

N_S3_34, N_S5_59, N_S6_61, N_S6_62 and N_S6_63

Output file: "Output_02062019" → Factor Analysis 3

Factor analysis subscales C, E, F and G (items 29, 30, 34, 59, 61, 62 and 63 dropped)

Same as "Factor analysis subscales B, C, E, F and G", but with different variables.

Variables: N_S3_25 to N_S3_38 and N_S5_54 to N_S7_73, but without items N_S3_29,

N_S3_30, N_S3_34, N_S5_59, N_S6_61, N_S6_62 and N_S6_63

Output file: "Output_02062019" → Factor Analysis 4

Factor analysis subscales C, E, F and G (items 27, 29, 30, 31, 34, 37, 59, 61, 62

and 63 dropped)

Same as "Factor analysis subscales B, C, E, F and G", but with different variables.

Variables: N_S3_25 to N_S3_38 and N_S5_54 to N_S7_73, but without items N_S3_27,

N_S3_29, N_S3_30, N_S3_31, N_S3_34, N_S3_37, N_S5_59, N_S6_61, N_S6_62 and

N_S6_63

Output file: "Output_02062019" → Factor Analysis 5

Reliability analysis Considering others

Analyze > Scale > Reliability Analysis

Variables: N_S6_64 to N_S6_67 and N_S7_71 to N_S7_73

Statistics > Item, Scale, Scale if item deleted, Correlations, Means, Variances, None >

Continue

Model: Alpha

OK

Output file: "Output_02062019" \rightarrow Reliability Considering others

Reliability analysis Expression of opinion

Same as 'Reliability analysis Considering others', but with different variables.

Variables: N_S7_68 to N_S7_70

Output file: "Output_02062019" → Reliability Expression of opinion

Reliability analysis ECA

Same as 'Reliability analysis Considering others'', but with different variables.

Variables: N_S3_25, N_S3_26, N_S3_28, N_S3_32, N_S3_33, N_S3_35, N_S3_36 and

N_S3_38

Output file: "Output_02062019" → Reliability ECA

Reliability analysis ECS

Same as 'Reliability analysis Considering others'', but with different variables.

Variables: N_S5_54 to N_S5_58 and N_S5_60

Output file: "Output_02062019" → Reliability ECA

Reliability analysis CKEP

Analyze > Scale > Reliability Analysis

Variables: N_S1_8 to N_S1_15

Statistics > Item, Scale, Scale if item deleted, Correlations, None > Continue

Model: Alpha

OK

Output file: "Output_02062019" → Reliability CKEP

Reliability analysis KCEP

Same as 'Reliability analysis CKEP', but with different variables.

Variables: N_S2_16 to N_S2_24, but without item N_S2_18

Output file: "Output_02062019" → Reliability KCEP

Reliability analysis ECR

Same as 'Reliability analysis CKEP', but with different variables.

Variables: N_S4_39 to N_S3_49

Output file: "Output_02062019" \rightarrow Reliability ECR

Computing mean and standard deviation Considering others

Transform > Compute Variable

Target Variable: "Considering_others_total"

Numeric Expression: "N S6 64 + N S6 65 + N S6 66 + N S6 67 + N S7 71 + N S7 72

+ N S7 73"

OK

Analyze > Descriptive Statistics > Frequencies

Variable(s): Considering_others_total

Statistics > Mean, Std. deviation > Continue

OK

Output file: "Output_02062019" → Frequencies Considering others

Computing mean and standard deviation Expression of opinion

Transform > Compute Variable

Target Variable: "Expression_of_opinion_total"

Numeric Expression: " $N_S7_68 + N_S7_69 + N_S7_70$ "

OK

Analyze > Descriptive Statistics > Frequencies

Variable(s): Expression_of_opinion_total

Statistics > Mean, Std. deviation > Continue

OK

Output file: "Output_02062019" → Frequencies Expression of opinion

Computing mean and standard deviation ECA

Transform > Compute Variable

Target Variable: "ECA_total"

Numeric Expression: "N_S3_25 + N_S3_26 + N_S3_28 + N_S3_32 + N_S3_33 + N_S3_35

 $+ N_{S3_{36}} + N_{S3_{38}}$

OK

Analyze > Descriptive Statistics > Frequencies

Variable(s): ECA_total

Statistics > Mean, Std. deviation > Continue

OK

Output file: "Output_02062019" → Frequencies ECA

Computing mean and standard deviation ECS

Transform > Compute Variable

Target Variable: "ECS_total"

Numeric Expression: "N_S5_54 + N_S5_55 + N_S5_56 + N_S5_57 + N_S5_58 + N_S5_60"

OK

Analyze > Descriptive Statistics > Frequencies

Variable(s): ECS_total

Statistics > Mean, Std. deviation > Continue

OK

Output file: "Output 02062019" → Frequencies ECS

Factor analysis subscales B, C, E, F and G (including values below .30)

Same as 'Factor analysis subscales B, C, E, F and G', but with different Options

Options > Exclude cases listwise, Sorted by Size > Continue

Output file: "Output 02062019" \rightarrow Factor analysis 1 (ook waarden onder .30)

Factor analysis subscales C, E, F and G (items 27, 29, 30, 31, 34, 37, 59, 61, 62

and 63 dropped) (including values below .30)

Same as "Factor analysis subscales B, C, E, F and G (including values below .30)", but with different variables.

Variables: N_S3_25 to N_S3_38 and N_S5_54 to N_S7_73, but without items N_S3_27,

 $N_{S3_{29}, N_{S3_{30}, N_{S3_{31}, N_{S3_{34}, N_{S3_{37}, N_{S5_{59}, N_{S6_{61}, N_{S6_{62}}}}}$

N_S6_63

Output file: "Output_02062019" \rightarrow Factor Analysis 5 (ook waarden onder .30)

Factor analysis subscale B

Same as "Factor analysis subscales B, C, E, F and G", but with different variables.

Variables: N_S2_16 to N_S2_24

Output file: "Output_02062019" → Factor Analysis 6

Factor analysis subscale B (including values below .30)

Same as "Factor analysis subscales B, C, E, F and G (including values below .30)",

but with different variables.

Variables: N_S2_16 to N_S2_24

Output file: "Output_02062019" \rightarrow Factor Analysis 6 (ook waarden onder .30)

Factor analysis subscale B (item 18 dropped)

Same as "Factor analysis subscales B, C, E, F and G", but with different variables.

Variables: N_S2_16, N_S2_17 and N_S2_19 to N_S2_24

Output file: "Output_02062019" → Factor Analysis 7

Factor analysis subscale B (item 18 dropped) (including values below .30)

Same as "Factor analysis subscales B, C, E, F and G (including values below .30)",

but with different variables.

Variables: N_S2_16 to N_S2_24 but without item N_S2_18

Output file: "Output_02062019" \rightarrow Factor Analysis 7 (ook waarden onder .30)