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Early childhood preservice teachers' attitudes towards online engagement, civic responsibility, and service learning

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Abstract

This study focused on early childhood preservice teachers' perceptions of online technology, service learning, and their understanding of their role as community leaders through service learning. A survey was conducted among preservice early childhood teachers in Taiwan. The questionnaire was comprised of three factors: online engagement, civic responsibility, and service learning. These variables were tested for their relationships and interactions with mediating and moderating effects. The findings showed that early childhood preservice teachers had positive perceptions of using online technology in their service learning course, and that they employed this tool to perform their civic responsibilities as teachers and citizens. Most importantly, they responded that service learning experiences were helpful in expanding their civic awareness and sense of social responsibility to help disadvantaged groups achieve better social living situations.

Keywords Civic responsibility · Early childhood preservice teacher · Online engagement · Service learning

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1 Introduction

Due to the importance of social responsibility in teacher education, preservice teachers must also value social responsibility and civic attitudes and behaviors alongside professional knowledge and pedagogical practices (Gerholz et al., 2018; Juaneda-Ayensa et al., 2019). Service learning combines academic and professional knowledge with practical social experiences to help preservice teachers develop respect for the unique situations of different groups, which in turn helps them to use their professional knowledge to help the children in their classrooms (Marshall et al., 2015; Ozias & Pasque, 2019).

Online technology, such as Line, Facebook, social media, can thus help preservice teachers in their understanding of socioeconomic status, disadvantaged groups, and minorities, and how to help children develop a positive sense of civic responsibility and literacy, which are essential characteristics of citizens of a democratic society (Bonini et al., 2016; ChanLin et al., 2016). However, preservice teacher attitudes towards civic responsibility and its link to professional practices are not only reflected in their access to and engagement in the communities of socially disadvantaged groups and other such social issues, but also relate to their perceptions and experiences of participating in service learning in university (Lee et al., 2018).

Despite the effectiveness of online technology and service learning in developing preservice teachers' sense of social responsibility and civic awareness, few previous studies have analyzed the relationship among online engagement, civic responsibility, and service learning among early childhood preservice teachers. It is thus necessary to clarify the interaction of service learning and online engagement in the development of civic responsibility among early childhood preservice teachers. Therefore, the researchers explored early childhood preservice teachers' perceptions about the impact of online engagement on civic responsibility in Taiwan, and examined the mediating and moderating effects of their attitudes toward service learning in the relationship.

1.1 The relationship among online engagement, civic responsibility, and service learning

Through the use of online technology, students can learn social facts and develop their civic literacy, thereby becoming active members of society (Chayinska et al., 2021). The online technology allowed them to listen to and understand the different social situations in which we live, and they integrated academic knowledge into social strategies that helped the minority (Ahmad & Gul, 2021). By utilizing online technology, students were able to learn about diversity, develop their motivations to engage in civic learning, and, in turn, develop their awareness of democratic activities (Breakstone et al., 2021). In their online behavior, they illustrate what they understand about the living conditions of different social groups based on their online participation.

Students can engage in multiple different communities through online technology, according to the technology acceptance model (TAM) or unified theory of acceptance and use of technology (UTAUT) (Casey et al.,2021; Lemay et al., 2019; Naranjo-Zolotov et al., 2019). The degree to which they perceived the usefulness and ease of use of online technology enabled them to integrate academic learning into social spheres, thus enabling them to make contributions to society (Bhagat & Kim, 2022). Through online technology, they can express their civic perceptions on behalf of different groups and discuss social justice issues. The positive attitudes toward online participation and engagement in civic affairs of college students promote civic engagement in a democratic manner. As a result, online communities became a platform for social and friendly discussion of social issues, which helped them take action in response to socially disadvantaged groups' needs.

College students' attitudes toward caring for disadvantaged groups via online engagement influence their responsibility to reflect on their existing considerations about social injustice and educational reproduction, as well as to take action in order to respect and acknowledge disadvantaged groups facing challenges (Karliani et al., 2019). To improve our democratic society, they employ online engagement to expand the wide consciousness of civic responsibility (Mahmood & Bhutta, 2018; Panke & Stephens, 2018). A positive perception of service learning among college students could be generated by focusing on their efforts to help social groups and develop practical strategies to improve people's lives.

Online engagement refers to the online perceptions and efficacy about social issues and civic affairs via the online technology (Castellanos & Cole, 2015; Lee et al., 2018). Users employ online technologies in order to join with different social groups and as a means of understanding their social existence (Keles, 2018). Online engagement helps college students and social groups to connect and allows them to conduct fair, open and friendly dialogues. They are able to create a supportive, virtual space, which allows them to resolve their social problems (Elverson & Klawiter, 2019).

Civic responsibility is referred to as the civic attitudes and practices required to take responsibility for helping disadvantaged groups and resolving social injustices (Nelson et al., 2016). College students often recognize their civic responsibility to help people in need and take actions to help improve their situations (Torney-Purta et al., 2015). In response to the need to belong to social groups, college students undertake their civic responsibility of using multiple resources in order to meet the needs of their community and do the appropriate alternatives.

College students have a role to play as citizens and are responsible for caring for society. Online technology helps them understand more about the truth of social injustice, encouraging them to take responsibility and to reflect single dimensional consideration (Burhan-Horasanli & Ortactepe, 2016; Jacquet et al., 2018). They employ these tools in order to explore the unequal living conditions of disadvantaged groups, and construct their social practices to reduce the social divisions that exist in reality.

Online technology allows preservice teachers to reflect on and review the social prejudices and the stereotypes that they have encountered in their experiences of pedagogical training. This helps them reduce social inequality. They have the responsibility

to construct a learning environment that provides equal opportunities for education, and that ensures that students from different backgrounds can access the educational resources they need to empower their own learning (Enright et al., 2017). Based on the above context, the present study focuses on the social awareness and civic consciousness of early childhood preservice teachers and the role of online technology in providing reliable channels to engage in community service and fulfil civic responsibilities. The researchers, therefore, proposed the first hypothesis:

Hypothesis 1: Online engagement will positively influence early childhood preservice teachers' civic responsibility.

In service learning, college students are provided with experiential learning opportunities to engage in real community, which enhances their understanding of diverse groups and their respect for others (Buff et al., 2015). They can improve their civic education and their understanding of the social-related curriculum.

College students who are currently involved in online communities or virtual world use online technologies to take care of their social experience of living in a group, and to help them build positive relationships in order to demonstrate their ability to learn and live (Baumgartner et al., 2020). They are encouraged to care about and to engage with the living situations of diverse groups of people by way of online technologies or virtual communities.

In service learning, preservice teachers acquire academic knowledge through social experiences, and explore practical solutions to help children from disadvantaged groups (Larsen & Searle, 2017). They perform their civic engagement as a way of implementing appropriate educational actions and to participate in a civic community. Preservice teachers also express a consideration regarding democratic social values and perform social commitments to specific social groups (Salter & Halbert, 2019). Online engagement helps them communicate and access service learning with different social groups, in turn serving to open their minds. This helps to develop their sense of social justice and to improve their civic values. The researchers, therefore, proposed the second hypothesis:

Hypothesis 2: Online engagement will positively influence preservice early childhood teachers' service learning.

Civic responsibility is reflected in the development of civic consciousness and cooperative action on behalf of disadvantaged groups through participation in community services (Porter et al., 2016). College students live in a democratic society and express positive preferences with regards to civic affairs (Dallinger, 2017). As citizens of a democratic society, college students have a social responsibility to carry out actions in a way that brings about social justice.

Through the practical work of social services, preservice teachers can strengthen their sense of social responsibility to help others as well as their attitudes towards community service (Liu & Wei, 2016). The positive perception of service learning among preservice teachers will help them to develop a sense of civic responsibility to help disadvantaged groups and integrate such an awareness into their teaching

practices (Garner & Parker, 2016). When preservice teachers engage in service learning activities, they not only help to improve the social empowerment and self-efficacy of disadvantaged groups, but they also improve their own sense of self-worth and identification as citizens and community members (Delaine et al., 2019).

Preservice teachers engage in service learning as a way of reflecting on their social practices and their civic responsibilities (Iyer et al., 2018). Service learning helps them to explore and understand the realities of the social affairs of disadvantaged groups. It also helps them to raise their awareness of civic learning and their responsibility to improve their pedagogy and to participate in social services (Garcia & Cuellar, 2018). They can learn from being helpful and from experiencing social services. Both of these help them to link their cognitive interest in civic responsibility and to participate in works of charity and volunteering. Ultimately, this builds their self-confidence and enhances their pedagogical capabilities. The researchers, therefore, proposed the third hypothesis:

Hypothesis 3: Service learning will positively influence early childhood preservice teachers' civic responsibility.

1.2 The mediating role of service learning

Early childhood preservice teachers' online engagement influences their civic responsibility and helps them perform their duties as positive and practical citizens in line with the principles of democratic values and civic responsibility (Elaldi & Yerliyurt, 2016). In the relationship between online engagement and civic responsibility, service learning plays a mediating role: service learning is a mediating factor that connects online civic understanding and engagement with the community to rethink and reflect on social problems in society (Kahne et al., 2016). It also affects early childhood preservice teachers' perceptions of democratic discussions and the social practices of civic responsibility in society.

Through service learning, early childhood preservice teachers have the opportunity to connect academic knowledge with practical community service, which helps them when confronting the difficulties often faced by socially or economically disadvantaged children and their families (D'Amico et al., 2020). They learn to connect social justice issues with early childhood education curricula and develop effective pedagogical practices and scaffolding for children from social diverse groups through service learning.

As a result of their engagement in and commitment to service learning, early childhood preservice teachers can implement their sense of civic responsibility in the classroom to improve the lives of disadvantaged children through more effective pedagogical practices. They can also interact with disadvantaged groups to construct meaningful and supportive curricula, and ultimately aid in the creation of a society based on the principles of equity and justice. Therefore, the researchers formulated the fourth hypothesis:

Hypothesis 4: Service learning will mediate the relationship between online engagement and civic responsibility.

1.3 The moderating role of service learning

Service learning helps early childhood preservice teachers to recognize their responsibility towards their society, to care about civic affairs, and to take actions in order to resolve particular problems (Li et al., 2019). It is their responsibility to consider urgent problems seriously and to come up with collaborative strategies that might provide solutions to those problems. Furthermore, they have the responsibility to help diverse groups through both empathy and their general civic consciousness (Park et al., 2019; Wang et al., 2019).

Early childhood preservice teachers who have experience of service learning can help young children raise their consciousness around issues regarding helping others and how to care for minorities (Knight-McKenna et al., 2019). Given that they deal with young children in society, they have the chance to incorporate those children into the practices of service learning. They also participate actively and voluntarily in different family and community activities. This allows them to inspire children to be actively engaged and take their civic responsibility seriously.

Early childhood preservice teachers have been shown to understand the importance of service learning and its impact on disadvantaged groups (Resch & Schrittesser, 2021). Possible reasons for this include curriculum design and ineffective service placements, which do not lead to a better understanding of social justice issues in society (Holland & Adam, 2016). Service learning provides the diversity outcomes and emphasizes the placement of its potential effectiveness and advantages.

Preservice teachers' may hold biased perceptions of disadvantaged groups that can influence their pedagogical practices. Therefore, the goal of service learning is to transform traditional perceptions and thus improve early childhood education. However, preservice teachers prefer to engage in service learning through online communities to develop relationships with others and assist disadvantaged groups. The researchers formulated the fifth hypothesis, and the research model is shown in Fig. 1.

Hypothesis 5: Service learning will moderate the relationship between online engagement and civic responsibility.

2 Methods

2.1 Sample characteristics

This paper focuses on preservice early childhood teachers as its research population. In our research, we selected Taiwanese universities or colleges that had departments of early childhood education and care. During the preservice teacher education program in early childhood, four years are spent learning or training. The researchers surveyed a sample of early childhood preservice teachers in Taiwan. The questionnaire was distributed among preservice teachers in various years of study at different universities.

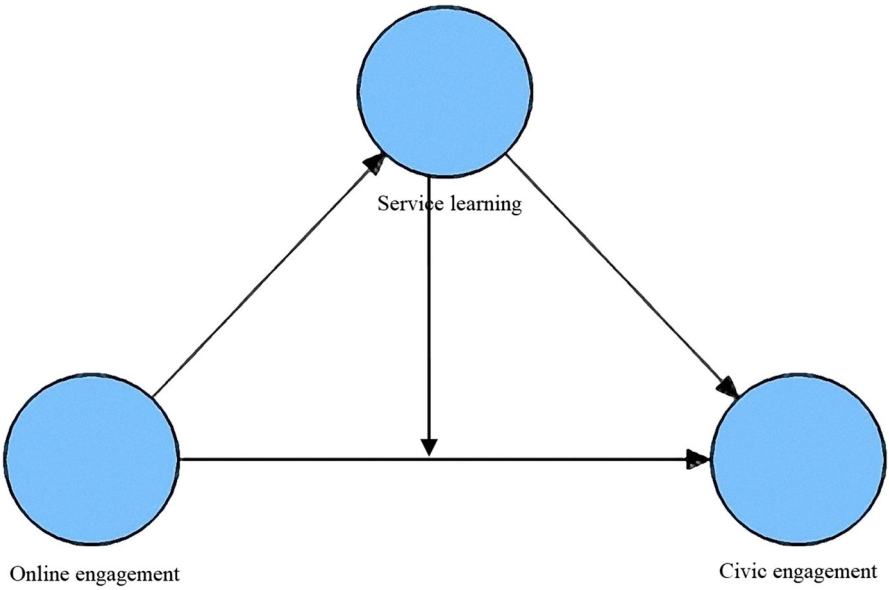

Fig. 1 The research model

In Taiwan, the service learning projects are designed as forms of either campus service or community service. Campus service refers to the process of cleaning the environment and providing assistance with school-aged activities. College students spend their extracurricular time doing such service over the course of one semester. For the preservice teachers studying early childhood education, instructors designed pedagogical service learning as a method to help them develop both their instructional awareness and their professional ethics with regards to young children. Some service learning projects engage with the wider community. They help young children with their learning and wellbeing. They provide multiple instructional activities in local communities.

According to statistics issued by the Ministry of Education in Taiwan, in the academic year 2015–2016, there were 158 colleges and universities. This includes 126 universities, 19 colleges and 13 specialist schools. As part of this study, we used a hierarchical sampling based on various regions and different levels of universities. A stratified sampling was conducted based on the researchers' geographical location, and universities of different types and sizes were considered. A sample of data was collected from 14 universities with early childcare professions. Researchers and research teams distributed questionnaires and collected data on campus by entering classes or student activity areas, depending on the grade level and department of college students.

The researchers choose an original sample of 500 completed questionnaires according to the parameters setting by the latent constructs and observed variables. After excluding any questionnaires with non-responses or missing values, the final sample size was 421. This was equal to a response rate of 84.2%. All

participants were told about the purposes of this research and the procedures for informed consent were practiced, and protected their privacy and confidentiality. The preservice teachers from the sample were mostly female, the majority was in their third year of study, and most had 1 to 2 years of service learning experience. A description of the survey demographics is provided in Table 1.

2.2 Measurement instrument

The present study focused on early childhood preservice teachers' attitudes towards the relationship among online engagement, civic responsibility, and service learning and its impacts. It also investigated the mediating and moderating effects of service learning in this model. A Chinese questionnaire, the "Online Engagement and Civic Responsibility (OECR) Attitude Survey," was administered. Based on literature analysis and theoretical hypotheses of this research, the researchers established the observed variables of the OECR and consulted and evaluated with scholars and specialists in the field of teacher education and service learning.

The OECR comprised three factors: "Online Engagement," "Civic Responsibility," and "Service Learning." The initial survey instrument consisted of 15 observed variables, and five variables for each latent construct in OECR. On a 5-point Likert scale, the participants stated their level of agreement/disagreement (1 = strongly disagree and 5 = strongly agree). A definition of each latent construct is addressed as follows:

1. Online Engagement (OE): measuring attitudes on the degree to which early childhood preservice teachers believe online technology is useful in their community service interactions and practices. The observed variables for online engagement were developed on the studies of Castellanos and Cole (2015); and Nelson et al. (2016).

Table 1 The summary of sample demographics

Characteristic of respondent	Number	Percentage
Gender		
Male	5	1.19
Female	416	98.81
Year		
First year	99	23.52
Second year	101	23.99
Third year	125	29.69
Fourth year	96	22.80
Experience with service learning		
Less than 1 year	78	18.53
1–2 years	213	50.59
2–3 years	98	23.28
Over 3 years	32	7.60

2. Civic Responsibility (CR): investigating the extent of early childhood preservice teachers' attitudes towards the civic responsibility to help and support the equal development of disadvantaged groups. Young children and their families from lower socioeconomic backgrounds or minority ethnic groups who lack equitable educational opportunities are defined as disadvantaged groups. The observed variables for civic responsibility were developed on the studies of Torney-Purta et al. (2015).
3. Service Learning (SL): measuring attitudes on the degree to which early childhood preservice teachers participate in service learning and develop their civic awareness to serve the community. The observed variables for service learning were developed on the studies of Bowman et al. (2015); Buff et al. (2015); Liu and Wei (2016); and Porter et al. (2016).

2.3 Data analysis

A partial least squares (PLS) involves a principal component analysis with multiple regressions, and provides a rigorous estimation to theory examination and development (Hair et al., 2013; Wong, 2016). The researchers used the SmartPLS 2.0.M3 software to evaluate the questionnaire data (Ringle et al., 2005), and tested the hypothesized model of the OECR. First, in the measurement model, the researchers measured the observed variables' factor loadings and examined their statistical significance. Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE) were used to measure the convergent validity and discriminate validity of the latent constructs in OECR.

Second, the researchers evaluated the collinearity, path coefficients, and the measures of explained variances in the structural model. This study measured the structural validity and goodness-of-fit (GoF) index to examine the acceptable degree of it. The measurement of total effect, direct effect, and indirect effects of the hypotheses between each latent constructs were tested. Based on the studies of MacKinnon (2008) and Preacher and Hayes (2008), bootstrap estimation was to test the statistical significance of the mediating role and the reasonable degree of research hypotheses.

Finally, the researchers tested the moderating model with the interaction effects of the latent variables (Baron & Kenny, 1986; Chin et al., 2003; Esposito Vinzi et al., 2010). The researchers converted the independent variable and moderating variable into standardized scores and calculate their interactional statistics. Then, they examined the path coefficient and statistical significance of the multiplicative items, and tested the moderating role in the relationship between the independent variable and the dependent variable.

3 Results

3.1 Measurement model

The researchers retained a reflective variable only when its loading was greater than 0.700 based on the results of the factor loadings of each latent construct. The

original 15 observed variables were retained to 12 variables. Table 2 showes the standardized factor loadings of each variable ranged from 0.814 to 0.898. The researchers used the bootstrapping method based on 5,000 resamples to examine the degree of statistical significance of the standardized factor loadings. The *p* values of statistical significance on the OECR for all observed variables were less than 0.001.

Table 3 showes the Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE) values of each latent construct of the OECR ranged from 0.864 to 0.890, from 0.907 to 0.924, and from 0.710 to 0.752, respectively. The correlation of the two latent constructs ranged from 0.610 to 0.629. The correlation coefficient between each latent construct pair was less than the respective square root of the average variance extracted. These results depicted the acceptable degree of reliability, convergent validity, and discriminant validity of the latent constructs, and suggested that the OECR measurement model had a reasonable reliability of internal consistency.

3.2 Structural model

The researchers used the variance inflation factor (VIF) to check for multicollinearity in the hypothesized model, and ensure that the problem of multicollinearity did not affect the reasonability of the hypothetical constructs in the structural model. If VIF is higher than 5, there will be a problem of collinearity in the predictive variables. In the present study, the collinearity between the dependent construct (CR) and the other predictive variables (OE and SL) was assessed by calculating the VIF. The results showed that the VIF values for OE and SL were 1.593 and 1.593 respectively (lower than the recommended threshold of 5). This result shows that the problem of collinearity between predicted variables was not significant.

Figure 2 shows the path coefficients and measures of the explained variance with the standardized parameter estimates in the structural model of the OECR. The construct of OE explains 37.2% of the variance in the construct of SL, corresponding to a standardized regression coefficient of 0.610. The constructs of OE and SL jointly explain 48.7% of the variance in the construct of CR, corresponding to standardized regression coefficients of 0.397 and 0.381, respectively. All path coefficients were indicated to be the high level of statistical significant ($p < 0.001$) by performing a bootstrap with 5,000 resamples, thus supporting H1, H2, and H3.

The GoF value was 0.566, which exceeds the reasonable value of 0.36 for large effect sizes (Wetzels et al., 2009). The researchers used blindfolding to estimate the predictive correlation of endogenous variables. The results showed that the predictive squared correlation coefficient (Q^2) of each construct ranged from 0.257 to 0.337 (higher than the recommended threshold of 0). The researchers continued to test the effect size of f^2 and q^2. Hair et al. (2013) proposed that the value of the test criteria 0.02 is weak, above 0.15 is moderate, and above 0.35 is strong. According to Table 4, the effect size measures for each latent construct were mostly low with moderate effect, which indicates that there was a practical significance in the structural model of the OECR.

Table 2 The summary of mean, standard deviation, factor loading, and *t* values

Latent construct	Observed variable	Mean	Standard Deviation	Factor loading	*t* value
Online engagement	V01: I think online technology can enhance my understanding of disadvantaged groups.	3.893	0.727	0.826	37.646***
Online engagement	V02: I think online technology can enhance my understanding of social justice issues.	3.827	0.708	0.898	64.964***
Online engagement	V03: I think online technology can help me to participate in community service.	3.855	0.724	0.882	61.379***
Online engagement	V04: I use online technology to improve my community service with disadvantaged groups.	3.831	0.725	0.862	47.033***
Civic responsibility	V05: I am responsible for caring about the living conditions of minority groups.	3.829	0.696	0.814	35.720***
Civic responsibility	V06: I am willing to learn about social issues.	3.924	0.726	0.830	37.527***
Civic responsibility	V07: I want to help people who are in difficult situations.	3.941	0.661	0.863	52.031***
Civic responsibility	V08: I want to take action to help disadvantaged groups improve their living situations.	3.948	0.705	0.873	52.019***
Service learning	V09: I like to participate in service learning activities.	3.876	0.758	0.828	37.456***
Service learning	V10: I think service learning can improve my learning effectiveness in my early childhood teacher education program.	3.836	0.740	0.841	44.953***
Service learning	V11: I think service learning can improve my social awareness in early childhood education.	3.803	0.779	0.872	56.365***
Service learning	V12: I enjoy improving my pedagogical skills through service learning.	3.812	0.781	0.828	40.383***

5,000 bootstrap samples. *** $p < 0.001$

Table 3 The Cronbach's alpha, CR, AVE, and correlation matrix

Latent construct	Cronbach's alpha	CR	AVE	(1)	(2)	(3)
Online engagement (1)	0.890	0.924	0.752	0.867		
Civic responsibility (2)	0.866	0.909	0.714	0.629	0.845	
Service learning (3)	0.864	0.907	0.710	0.623	0.610	0.842

The square root of the AVE of the two latent constructs is derived on the diagonal, and the correlation coefficient is derived on the below diagonal

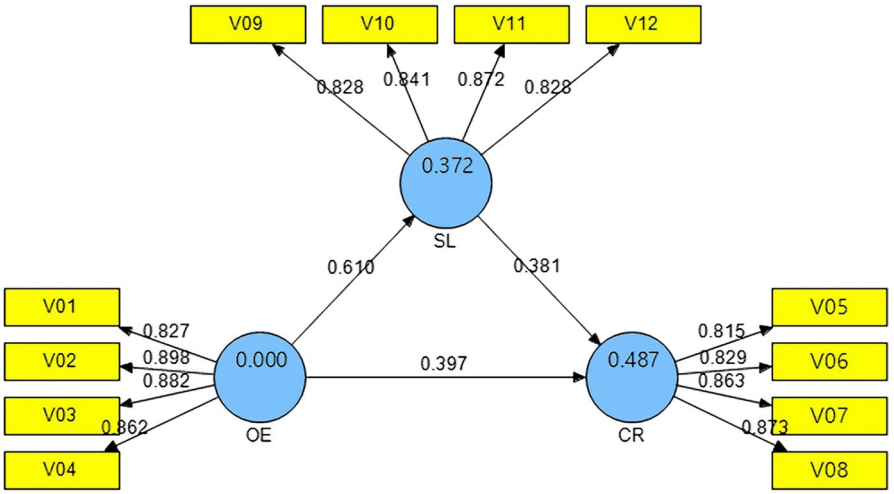

Fig. 2 The structural model

Table 4 The test of validity in the structural model

Latent construct		CR	
	Q^2	f^2	q^2
OE		0.189	0.107
SL	0.257	0.177	0.084
CR	0.337		

3.3 The mediating model

As Table 5 shows, the total effect of OE on CR without the mediator of SL was 0.646 (t value = 17.309, $p < 0.001$). After adding the mediator of SL to the relationship between OE and CR, the direct effect of OE on CR decreased to 0.416 (t value = 7.552, $p < 0.001$). The researchers used the Sobel test to examine the significance of the mediating effect. The indirect effect of SL on the relationship between

OE and CR was 0.230 (t value = 5.899, $p < 0.001$). Bootstrapping was employed with 5,000 resamples to calculate the standard error of each path coefficient and test the significance of the indirect effects in the mediating model (Preacher & Hayes, 2008). The total and specific indirect effects of the 95% confidence interval do not include zero. The construct of SL partially mediated the relationship between the construct of OE and CR, thus supporting H4.

3.4 The moderating model

The researchers converted the scores of the independent variable and moderated variable to standardized scores and estimated the moderating effect of the interaction from the 5,000 bootstrap samples to test the statistical significance. The results showed that the moderator on CR was −0.158 (t value = 2.173, $p < 0.05$). This moderating effect was found to be significantly negative. The moderator of SL generated negative moderation on the relationship between OE and CR, thus supporting H5. The explanatory power of the main effect was 0.487. This relationship with the moderating effect was 0.511. The effect size of the moderating effect was 0.049.

4 Discussion and conclusion

The researchers used the PLS to analyze the early childhood preservice teachers' attitudes towards the relationship between online engagement and civic responsibility, and examined the mediating and moderating effects of service learning on this relationship. The PLS findings of the OECR examined the path coefficients and accepted the H1 to H5 hypotheses. The results showed that service learning had partially mediated effects and played a negative moderating role in this relationship.

The value of this study is its presentation of the importance of service learning in the relationship between online engagement and civic responsibility, and its analysis of the effects of the mediator and moderator of service learning to provide early childhood teacher education or related units to help early childhood preservice teachers practice civic responsibility and help young children from disadvantaged communities. Online technology opens and develops the perceptions of social justice for early childhood preservice teachers, and service learning

Table 5 The test of mediating effects

Total, direct, and indirect effects	Point estimate	t value	Bootstrapped 95% CI	
			Lower bound	Upper bound
Total effect	0.646	17.309***	0.573	0.719
Direct effect	0.416	7.552***	0.308	0.524
Indirect effect	0.230	5.899***	0.154	0.307

5,000 bootstrap samples. ***$p < 0.001$

provides realistic engagement for different social groups. The results also indicate that early childhood preservice teachers' perceptions of civic engagement and social responsibility were moderated by the considerations of service learning.

In terms of the mediating analysis, service learning partially mediated the relationship between online engagement and civic responsibility. As a result, service learning had more significant effects on civic responsibility than online engagement. Based on the literature analysis (D'Amico et al., 2020; Elaldi & Yerliyurt, 2016; Kahne et al., 2016), early childhood preservice teachers were able to promote the social justice of minority groups through service learning. By utilizing service learning constructs to identify early childhood professionals and establish educational partnerships with the real world, they can ensure they have the social responsibilities of helping young children and their families by caring for the disadvantaged. This will ensure that they take care of the disadvantaged.

Early childhood preservice teachers have better opportunities to learn social skills and cooperate through service learning. It is through these activities that they are able to develop caring and reflective actors with a sense of social responsibility. In order to create friendly and democratic classroom environments for young children of advantaged families, they can utilize their professional skills as educators to resolve pedagogical problems. For early childhood preservice teachers, this teaching model further enhances their academic literacy and critical thinking skills. They will be able to develop their cognitive and social pedagogical skills through this program. Additionally, it encourages them to be more disposed to social equality when it comes to early childhood education.

Based on the moderating analysis, service learning had a negative impact on this relationship. According to these results, early childhood preservice teachers with positive views of service learning had little preference for online engagement and civic responsibility. Based on a literature review (Holland & Adam, 2016; Knight-McKenna et al., 2019; Resch & Schrittesser, 2021), service learning helps early childhood preservice teachers construct socially meaningful approaches to learning. In addition to developing empathy and sensitive attitudes towards socially disadvantaged groups, it also enables them to develop friendly viewpoints about them.

Service learning could be used by early childhood preservice teachers to reflect on their own stereotypes and social biases. By using their academic knowledge, they can assist young children in integrating in a multicultural environment. In order to help minorities, early childhood preservice teachers who are positive about service learning recognize the importance of combining academic knowledge with community practices. Their civic responsibility regarding social groups is being fulfilled through this activity. Through critical reflection and dialogical praxis, they can learn how to cooperate with different groups as a way of enhancing their professional knowledge of social issues.

According to the survey analysis, early childhood preservice teachers' perceptions of service learning were influenced by their perceptions of online engagement with and civic responsibility towards disadvantaged groups. They articulated their motivations and learning experiences in service learning with their social responsibility and civic commitment as well as their considerations of social injustice and

inequity for disadvantaged groups. As early childhood preservice teachers develop their professional careers, service learning plays an essential role in enhancing their instructional practices and pedagogical literacy of diverse backgrounds of their students and their families.

Additionally, online engagement has an important impact on the perception of civic responsibility among early childhood preservice teachers. The use of online technology allows early childhood preservice teachers to practice their social awareness in different cyberspaces. Early childhood teacher education specialists may train students how to use internet technologies to help minority pupils. The college classroom can be a place where early childhood preservice teachers collaborate with peers and members of online communities to solve social issues. They can take part in online groups focused on the educational aspects of teacher education. Through these instructions, they would be able to engage with social movements, make their voices heard, and empower democratic action for those who are disadvantaged.

Furthermore, online technology can enhance this process by fostering an interactive and supportive environment. Professors and preservice teachers in early childhood education can link online involvement to the expression of political and pedagogical attitudes, as well as social activist viewpoints. Using online technology can increase their understanding of disadvantaged groups' unfair living conditions. The use of online technology not only assists them with interpersonal communications and community connection, but also allows them to explore their sense of civic responsibility to help disadvantaged social groups and engage in society collaboratively.

Professors in early childhood teacher education can integrate social commitment and supportive action into service learning to help preservice teachers consider the social needs of disadvantaged groups, and develop their sense of civic responsibility to be good citizens and meet the needs of students from disadvantaged social groups. Furthermore, professors in early childhood teacher education programs can integrate online interaction and virtual communities into the learning contents of courses on social justice and civic responsibility. By creating a link between online engagement and service learning, professors can provide multiple learning contexts and service models to help early childhood preservice teachers engage in their service to disadvantaged groups, develop community partnerships, and employ responsible strategies to resolve their social problems.

Based on the service learning required in Taiwanese universities, there are multiple practical plans to implement similar projects in order to engage with both preservice teachers and local communities. There might be some possible factors affecting preservice teachers' attitudes towards online engagement, civic responsibility, and service learning. These include the depth of the experiences of service learning, the requirements of preservice early childhood teacher training programs, and the different instructional designs of different institutions. Future research could employ multiple-group analysis and structural equation modeling in order to deal with the different sample data.

Furthermore, it would be beneficial to use qualitative research methods such as observations and interviews to obtain more information about the civic consciousness of early childhood preservice teachers and to explore their perceptions about

online engagement, civic responsibility, and service learning. Future research can employ multiple discourses to explore early childhood preservice teachers' perceptions of service learning and their online civic behaviors. With the integration of multiple methods into this topic, we can learn more about social and civic discourses to understand the relationships among early childhood preservice teachers' attitudes and behavioral intentions concerning their civic responsibility.

Data availability The data that support the findings of this study are available from the corresponding author.

Declarations

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all individual participants involved in the study.

Conflict of interest All authors declare that they have no conflict of interest.

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