Adolescents in Spatial Planning – A Digital Participation Platform for Smart Environmental and Democratic Education in Schools

Melanie Piser[1], Sebastian Wöllmann[2], Roland Zink[2]

[1]Deggendorf Institute of Technology, Deggendorf/Germany · melanie.piser@th-deg.de
[2]Deggendorf Institute of Technology, Deggendorf/Germany

Abstract: Environmental and democratic education has become a must for modern societies in times of emerging nationalism, increasing ecological crises and disruptive technical innovations. At the same time recent teenage activist campaigns like Fridays for Future reflects their interest in, and critical reflection of recent trends, global thinking and local policy making. Young people are relying on digital and social media for their global as well as national and local organisation and participation. The PUBinPLAN digital participation platform, which adopts widely-used social media functions presents an option for the educational mandate. It was originally developed as a participation platform for regional development and municipal infrastructure projects, but the process of municipal planning has been transferred to school projects and web-based participation tools have been adapted so that pupils henceforth can be educated in decision making. The case study shows the mapping of waste on this platform with a local school class.

Keywords: Digital participation, environmental education, web-mapping, spatial planning

1 Introduction

Computer-aided teaching has found its way into current school curriculums. Environmental and democratic education can be combined with new forms of media education. To keep lessons up-to-date and attractive for students, not only regarding the content but also the didactic methods, new applications are needed. The presented digital participation platform PUBinPLAN, based on widely-used social media functions, is a tool which can be the missing link. Children learn playfully the competence of using electronic democratic measurements as a function in a smart city.

2 Digital Participation of Youths for Spatial Planning

Participation processes are mostly planned for adults of legal age who are eligible to vote. According to STIFTUNG MITARBEIT (2019) analogue participation processes are dominated by older, retired, educated, wealthy and local men. Children are not the focus, but it makes sense to involve them, because the decisions concern them as well. They are the future voting generation. As can be seen at the moment, adolescents are not uninterested in politics, exactly the opposite, they protest every week for change in climate policy in the Fridays for Future campaign. With appropriate digital applications there are possibilities to include them in democratic spatial decision making. They can contribute with their special regional and spatial knowledge and perceptions (JEKEL 2006).

Journal of Digital Landscape Architecture, 5-2020, pp. 584-591. © Wichmann Verlag, VDE VERLAG GMBH · Berlin · Offenbach. ISBN 978-3-87907-690-1, ISSN 2367-4253, e-ISSN 2511-624X, doi:10.14627/537690060.

Using the PUBinPLAN application, communication and interaction between all participants in a web-based environment is encouraged. It allows for more students to be involved than in a regular analogue process and it is a possibility for shy kids to express their opinions in an anonymous environment. This helps students to improve skills in several fields, like democratic spatial planning, media competence, written rhetorical and argumentative abilities and also enhances personal development, e. g. self-actualization and self-confidence. In return to the appreciation for the minors through the possibility of taking part in a decision making process, their sense of responsibility, identification, tolerance and consideration rises (SCHERIAU 2006).

The embedding of public participation methods in the school curriculum has the advantage of providing an appropriate setting for participation and mitigates unequal power relationships. Teachers have the knowledge and resources to impart the content and they play the trusted part of mediator between the participants for an effective and collaborative process (KEMPER 2012, 55ff.). This gives cities and politicians feedback from the future voting generation in their efforts to create adequate public spaces (KEMPER 2012).

In a survey by the University of Zürich in 2002 for Unicef, 72 % of the 12.800 asked adolescents between 9 and 16 years expressed the wish to contribute in communal decision making, but just 7 % had already had experience in public participation (KEMPER 2012, 54). This gap of the past shows clearly the potential for democratic education combined with digital participation platforms for lowering the participants' inhibition level.

Certainly, the kind of student participation has to be suitable for their demands, so it can take full effect.

2.1 Stages of Participation

According to ARNSTEIN (1969) there are different rungs in the ladder of participation. But not every rung is applicable for minors and leads to the positive effects mentioned above.

The whole ladder can be divided into three sections, Nonparticipation, Tokenism and Citizen Power, which can also be distinguished in eight different stages of participation: Manipulation, Therapy, Informing, Consultation, Placation, Partnership, Delegated Power and Citizen Control.

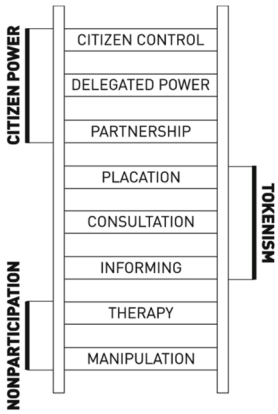

Fig. 1:
Ladder of Participation (cf. ARNSTEIN 1969)

As Nonparticipation says, Therapy and Manipulation are not appropriate methods of participation because there is no choice given. Also, Tokenism is just about informing and offers no two-way interaction between the different stakeholders. Real Participation begins in the Citizen Power with Partnership, Delegated Power and Citizen Control parts.

Nonparticipation is not advisable, because that causes feelings of not being taken seriously and Citizen Power is insofar difficult because of the age of the participants. In order to achieve collaboration on equal footing the minimum should be Consultation with the promise that their collected ideas will be taken into consideration. More preferable would be a predefined Partnership setting whereby students can inform decision-makers in the decision making process but within the limitations of the appropriate statutory provisions due to their underage status.

2.2 Digital Participation with the Web-Based Platform PUBinPLAN

For collecting the opinions of the students PUBinPLAN adopts widely-used social media features. Adolescents are used to these functions in their private lives. Transferred to administrative processes they can contribute to and improve both their environment and their media competency in a contemporary way. This playfully strengthens their awareness of nature and democracy. Using this medium, students are shielded from the possibility of personal attacks. Before a post is made visible, an administrator can read and determine if it complies with the terms of service, which explicitly state that no private information, insults or off-topic comments are allowed. If all these points are adhered to, the post goes public.

Digital platforms can be used at all times and from places all over the world, so there is almost no limitation for participation. Involving citizens using digital media, also known as e-Government, is also the aim of a smart city for better social cohesion and advanced administration. Our experience with digital platforms shows that city revitalizations, for example, are conducted in a more constructive and transparent manner, reduces costs and the schedule and outcome are more accepted compared to when only using PUBinPLAN the usual analogue methods. For adolescents this is an advantage, too. They can post their opinion at any time in school as well as at home, so they can express themselves independently and at their own convenience.

All features are possible given the following special technical construction of PUBinPLAN.

2.3 Technical Details of the Participation Platform PUBinPLAN

The applications' architecture is use-case-based and so the software is split into three layers (E1, E2, and E3). The base data is saved and provided by a PostgreSQL database and the PostGIS extension to save and spatially calculate complex geometries in layer E3. The second layer (E2) processes the saved data server-side, prepares it to for displaying in the front end and then sends it to the users' client/browser. The server saves and validates the administration for projects, posts, comments and users. An extensive rights system is implemented to control access rights for each user and to moderate the projects. Layer E1 serves as an interface between server and user. Actually, there are three parts: First, the system administration, second, the crowdsourcing application and third, the 3D-viewer (Fig. 2).

In the first part, administrators can control user accounts, user access settings and filter content that does not conform to the terms of service. In addition, the login system is integrated

here. The crowdsourcing part handles everything related to projects, user work and user generated content. The front end is based on HTML 5 and is therefore supported by all modern browsers like Google Chrome or Mozilla Firefox. Furthermore, frontend-wise the application uses the JavaScript library Openlayers 5 for the interactive map, the CSS Framework Bootstrap 3 and the JavaScript library JQuery 3 for the user interface and the dynamic loading of content. These features are publicly available at present.

While the two described parts are already commercially available, the third part is currently being developed. For displaying and discussing 3D-Models, the graphic interface WebGL and the JavaScript library BabylonJS is used. The user will be able to post, comment and vote on and in the 3D-models like in the WebGIS-map. Therefore, the project administration will be extended server-side.

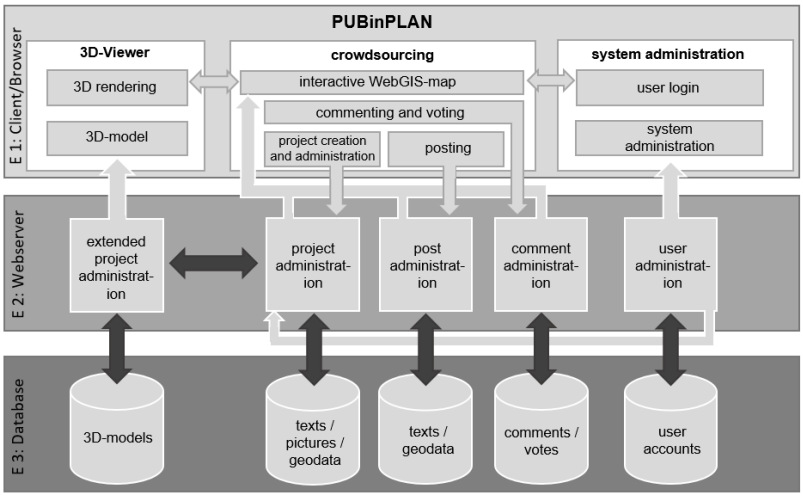

Fig. 2: Architecture of the platform (PISER & ZINK 2019)

3 Case Study: Mapping Work with Students

Through the use of the platform students gain skills in media competency combined with democratic processes. Geo-information is used daily in different contexts, so a digital participation platform with an integrated map is an educational approach for teaching media competency and proper use of new technology and data. In addition, explorative and problem-oriented learning is supported. Students learn the pedagogical concept above, of which the stages are (DE LANGE 2006):

1) Recognition of the problem
2) Formation of hypotheses
3) Solution strategy
4) Problem solution
5) Verification, falsification or modification of the hypothesis
6) Reflexion

Students acquire skills for coping with future tasks like spatial thinking, positional relationship, handling data and interpreting different maps and other visually generated information in an effective and playful manner (SCHERIAU 2006, 89, 96). Summarized, it promotes professional skills, orientation competence, methodological competence, presentation skills and social competence and the ability to perform in spatial aspects (KULTUSMINISTERKONFERENZ 2005). To train these objectives, as stated in German curriculums, students were tasked to map garbage, which was found in a defined outdoor area on the web map.

3.1 Task Description

On the property of Deggendorf Institute of Technology and the bordering area of a past state horticultural show along the shore of the Danube, littering does occasionally occur. Littering is the pollution of landscape with leftover garbage (BUNDESAMT FÜR UMWELT BAFU 2019). First, the students had to map all items related to waste found in the blue project area (Fig. 3), such as garbage bins, garbage spots, recycling stations or persons who litter. Afterwards they were tasked to devise a plan to improve local waste management

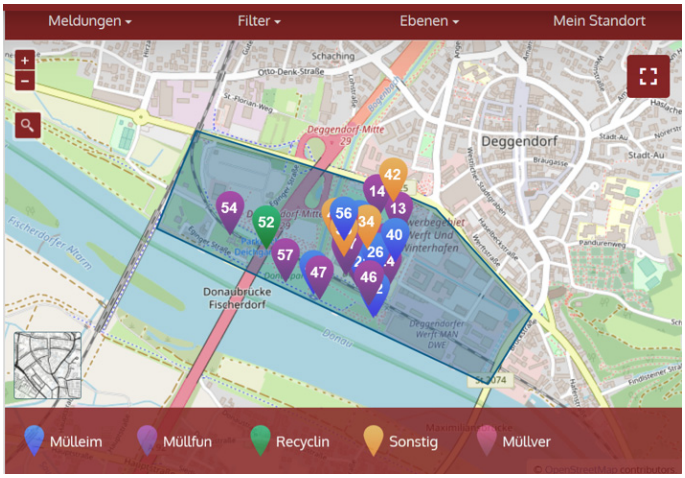

Fig. 3: Project area for the mapping work (PUBINPLAN 2019)

3.2 Lesson Methodology

19 students from our partner school, Gymnasium Niederalteich, came to the Deggendorf Institute of Technology to first hear a lecture about garbage. Together the students and teacher talked about plastic garbage, how it is produced and recycled, how it decays and what dangers it causes. The subject matter was visually illustrated using photos of sea animals and beaches near dumping grounds. The students gave the feedback that the photos were shocking, but evocative. Subsequently, the corrosion of plastic to microplastics in comparison to other material was presented and every student was given a piece of garbage, e. g. plastic wraps of crisps, an apple, a glass jar, newspapers, diaper, aluminium, cigarettes, batteries, plastic bottle, etc. and they had to decide how long it takes to degrade. They lined up in a time line with their garbage piece to demonstrate the timespan.

Afterwards, they started to work with digital maps. In small groups they converted the time period in distance and entered the figures into Google Earth in a south-eastward direction compliant with the cardinal direction as instructed. The clue was that the longest time period corresponded with the distance between Deggendorf and Gymnasium Niederalteich. This formed their time and spatial thinking and evaluation of positional relationships.

Fig. 4: Conversion of timespan into distance (GOOGLE EARTH 2019)

Fig. 5: Posting of an idea: A dustbin with sensors (PUBINPLAN 2019)

After this theoretical input the students went outside with their mobile phones to look for all items which are related to garbage, e. g. litter, recycling stations, sanitation workers, waste bins, improvement proposals, etc. They marked everything on the web map which is the core of the digital participation platform. They also saved a description of the item and a photo of it. This task took 1,5 hours.

Together all postings were collected and discussed. A second lecture about smart cities worldwide and waste disposal followed. The class learned about the reasons for local littering and smart solutions for avoiding it. Ideas like a talking dustbin led to a lively discussion. It was suggested that there should be compliments when a piece of garbage is thrown in the bin, as a kind of social credit system. This led to the controversial question, whether this could be a solution for every culture, e. g. China. The pros and cons of a smart and digitalized city in different cultures were critically gathered and discussed. The results will be presented to the town administration to show the efforts of the students to contribute to local issues such as improving urban waste management.

Table 1: The Workshop Followed the Principles of Teaching with Introduction/Motivation, Recognition of the Problem, Content/Material, Consideration/Practice, Repetition and Finalization

Principles of teaching	Content in class
Introduction/motivation	• Lecture about plastic garbage
Recognition of the problem	• Lecture visualized through figures and photos of garbage in the sea • Lecture about waste disposal and export to Asia
Content/material	• Figures and photos • Google Earth • Using mobile phones and geo-information on the digital participation platform • Discussion of pros and cons of smart city ideas
Consideration/practice	• Demonstrating the time span of plastic degradation • Media competency with web-based maps • Spatial thinking and positional relationship • Walk in the neighbourhood for mapping garbage • Discussion of smart city ideas
Repetition	• Critical thinking about smart city ideas • Transferring smart city ideas to other cultures
Finalization	• Conclusion of all ideas • Feedback of learnings

4 Discussion

The participation measures of children are a subject of controversial public discussion. One opinion says that children are the next generation and must therefore be involved and prepared for democracy. Another point of view refuses all possibilities of influence by minors. As the case study shows pupils are absolutely capable of evaluating the local situation and developing new ideas. And, since are they affected by the decisions it is appropriate to call

them in. Using digital media like a safe participation platform in schools is therefore a useful advancement for all involved participants and offers advantages in handling and organizing of the data input.

5 Conclusion and Outlook

The waste mapping project was initiated to transfer the ideas of a digital participation platform for school classes. The use of spatial planning processes in infrastructural projects was adapted for school curriculums, taking into account the individual and legal requirements of minors. This results in positive effects for their professional competences as well as social skills and individual responsibility. Also, civil society benefits, because the results will be communicated to the town administration and informs its implementation processes. As the feed-back and the outcome shows, this school workshop in democratic and environmental education was a valuable opportunity for minors to contribute actively in a process where they are otherwise voiceless.

References

ARNSTEIN, S. (1969), A Ladder Of Citizen Participation. Journal of the American Planning Association, 35 (4), 216-224. http://dx.doi.org/10.1080/01944366908977225.

BUNDESAMT FÜR UMWELT BAFU (2019), Littering. https://www.bafu.admin.ch/bafu/de/home/themen/abfall/fachinformationen/abfallpolitik-und-massnahmen/littering.html (08.10.2019).

DE LANGE, N. (2006), Geoinformationssysteme in Schulen – derzeitiger Stand und zukünftiger Einsatz. In: JEKEL, T., KOLLER, A. & STROBL, J. (Eds.), Lernen mit Geoinformation. Wichmann, Heidelberg, 11-22.

GOOGLE EARTH (2019), http://www.google.de/intl/de/earth/.

JEKEL, T. (2206), Virtuelle Flüge, räumliches Problemlösen, kritisch-konstruktive Didaktik – Anforderungen an Lehren und Lernen mit Geoinformation. In: JEKEL, T., KOLLER, A. & STROBL, J. (Eds.), Lernen mit Geoinformation, 23-34. Wichmann Heidelberg.

KEMPER, R., FRIEDRICH, S., MURI, G. & SLUKAN, V. (2012), Jugend-Raum. Aneignung öffentlicher Räume durch Jugendliche. Monsenstein und Vannerdat.

KULTUSMINISTERKONFERENZ (2005), Einheitliche Prüfungsanforderungen in der Abiturprüfung Geographie, February 10, 2005. http://www.kmk.org/doc/beschl/196-12_EPA%20Geographie.pdf (05.01.2020).

PISER, M. & ZINK, R. (2019), Digitale Partizipation zur integrativen und nachhaltigen Gestaltung ländlicher Räume, 136-139. In: FH Campus Wien – Verein zur Förderung des Fachhochschul-, Entwicklungs-und Forschungszentrums im Süden Wiens. ISBN 978-3-902614-55-1.

PUBINPLAN (2019), https://pubinplan.th-deg.de/projects?id=59 (10.01.2020).

SCHERIAU, H. (2006), GIS in Education – das Kärntner Geographische Informationssystem (KAGIS) geht an die Schulen. In: JEKEL, T., KOLLER, A. & STROBL, J. (Eds.), Lernen mit Geoinformation, Wichmann, Heidelberg, 88-97.

STIFTUNG MITARBEIT (2019), www.mitarbeit.de (18.09.2019).