



The Use of E-Portfolios in Working with Pre-School Children

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Abstract: The advancement of information technologies has contributed to shaping a different vision of the life of society as a whole. In the age of digitalisation, society faces various changes in communication, as well as in everyday life. In the context of pre-school education and upbringing, the use of technology is on the rise for the purposes of implementing numerous educational activities. Communication with parents, monitoring the children's personal growth and their behaviour, discovering the talents and abilities of pre-school children, and potential opportunities for preventing undesirable behaviour comprise activities which can be significantly improved by resorting to e-portfolios.

Accordingly, this research aimed to explore the importance and methods of use of e-portfolios in working with pre-school children, as well as to pin down the prevailing type of e-portfolio based on pre-school teachers' experiences. The research included 138 pre-school teachers from the city of Pirot, Serbia. Research results show that pre-school teachers resort to e-portfolios in pre-school institutions mostly to monitor children's personal growth and behaviour. Consequently, they use such e-portfolios to prevent undesirable behaviour (with a special focus on aggressive behaviour). Likewise, the results indicate that an in-depth assessment e-portfolio is predominantly used by pre-school teachers, while the least frequently used is the subject-specific e-portfolio.

Keywords: e-portfolio, use, pre-school institution, types of e-portfolio, pre-school teachers

Introduction

The outbreak of COVID-19 contributed to the accelerated advancement of technology and a more widespread use of digital tools in education and upbringing (Slade et al., 2020). In the field of education, an e-portfolio provides one with simple access to all outputs, i.e. school materials important for monitoring the personal growth, learning and behaviour of each child. The use of e-portfolios has quickly prevailed among students and teachers, while on the level of a pre-school institution, e-portfolios started to be implemented somewhat later. Although the available reference literature on the use of e-portfolio in pre-school institutions is rather scarce, the relevant reference literature indicates that research studies do explore the issue of creating individual portfolios, but primarily in a traditional form (printed

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version) (Wortham et al., 1998; Hebert, 2001). The difference between the traditional and electronic portfolios is that the traditional version implies that children perceive their portfolios as projects which have been carried out, presented and filed away (Chang et al., 2014; Lai et al., 2016). A modern version, i.e. electronic portfolio offers the possibilities of continuous personal growth, whereby an e-portfolio is constantly improved and revised depending on children's personal growth, new knowledge and behavioural changes (Lopez Crespo et al., 2022). An electronic portfolio is a more dynamic tool that creates an opportunity for the application of digital competencies necessary in the process of modern education and upbringing (Xe et al., 2019). For instance, interaction between children and information technology tools can be beneficial for the development of thinking, attention, speech, memory, imagination, perception and the like (Mihăilă-Popa, 2023). Accordingly, including children in the production of personal e-portfolios in a pre-school institution can be both useful and interesting.

Implementation of an e-portfolio at the level of a pre-school institution is based on perceiving its potential advantages (for example, continuous monitoring of personal growth, behaviour and thinking, nurturing self-reflection, learning achievements, preventing undesired behaviour, etc.) (Chang et al., 2018; López-Crespo et al., 2022; Zhang & Tur, 2022). Potential advantages of e-portfolios can be observed in the communication with parents, discovering the talents and abilities of children, monitoring their personal growth and behaviour, collecting materials which can be useful for preventing undesired behaviour, etc. (Dan & Simon, 2021).

According to the current basics of pre-school education programme (Years of Ascent, 2019), keeping an electronic portfolio is a voluntary activity and it depends on teachers' digital competencies. Considering that changes in the sphere of education primarily entail the staff's professional development, purchasing of equipment, and sufficient time for implementing innovations, this research aimed at considering the situation in practice concerning the use of e-portfolios in a small community in the southeast of Serbia.

Theoretical Framework

The term *portfolio* is of Latin origin and it is derived from the phrase *portafoglio* which in a loose translation means **to carry papers**. The traditional, printed version of a portfolio implies a thin, mobile file organiser containing notes, documents, drawings, etc. (Lam, 2018). Rapid technological development as well as digitalisation contributed to the emergence of the e-portfolio which is considered an important tool for studying, monitoring and assessing children (Lam & Lee, 2009). An e-portfolio is interpreted as "a digital version of a profile or a log book about learning which children currently have in pre-school education institutions" (Penman, 2014:10). According to the author Barrett (Barrett, 2007), e-portfolio is a collection of creative materials and activities which shows the progress and achievements in one or more areas. In addition to digital materials, e-portfolios include data important for monitoring children's personal growth, behaviour and learning process.

E-portfolio is significant for a systematic collection of children's creative work, drawings, video clips, songs, models, projects and the like, which pre-school teachers observe as an important source of materials useful for monitoring the process of personal growth and learning, setting new educational goals, monitoring behaviour, socialisation, as well as preventing undesired behaviour (Pennazio & Fedeli, 2021). Additionally, in pre-school institutions, e-portfolio is often used as a tool of communication between pre-school teachers and parents (Higgins, 2015). Data obtained through research (Beaumont-Bates, 2017) show that an e-portfolio is well-suited for building the relationship between pre-school teachers and parents, emphasising that online communication fosters the inclusion of parents in the process of education of their children. Likewise, through e-portfolios, parents have the opportunity to monitor the behaviour of their children in the community, their activities in kindergarten, their attitude towards assignments, resourcefulness, etc. (Hebert, 2001). Owing to such practice one can notice different forms of behaviour that diverge from the socially desirable and typical behaviour of pre-school children, and in collaboration with educational specialists one can undertake timely preventive actions.

Taking various criteria, uses and data into account, numerous authors tried to classify e-portfolios according to their types (Halaydina, 1997.; Slater, 1996.; Melograno, 2000). For the purposes of this paper, authors will review those types of portfolios which overlap in the afore-mentioned classifications and which are considered easier to apply in practice. A *comprehensive e-portfolio* should include all children's works and activities. This type of e-portfolio allows for long-term record-keeping which later provides an insight into the process of a child's personal growth. A *showcase e-portfolio* comprises only the best child's works and activities. This e-portfolio is characterised by the fact that each child should be allowed to independently choose a specific creative output or recorded activity for this e-portfolio. The

use of this kind of e-portfolio encourages children to be self-reflective, it motivates them to critically review their achievements and choose those outputs that they deem representative. This method contributes to the development of self-esteem and self-respect in children. A *subject-specific e-portfolio* is used to monitor the progress in a certain domain, and it is used later to consider cognitive and affective skills, as well as a child's personal growth, learning and behaviour. A *formal documentation e-portfolio* is a kind of e-portfolio which implies a formal record-keeping of a child's activities such as presence, interest in activities, outputs in different areas suitable for assessing a child's personal growth, achievements and behaviour. This type of e-portfolio should be subject to assessment by a pre-school teacher, which is not necessary for other previously mentioned types of e-portfolio. An *in-depth assessment e-portfolio* is a type of e-portfolio which enables a long-term collection of detailed materials (child's activities, works and other materials) which is very important for the latter assessment of a child's personal growth, learning and behaviour.

Methodological Framework

The goal of this research was to establish the experiences of pre-school teachers in the process of using e-portfolios in working with pre-school children. The defined goal has been achieved based on the following research tasks: to explore the use of e-portfolios at the level of a pre-school institution; and to determine the prevailing type of e-portfolio based on pre-school teachers' experiences. For the purposes of the research, the following variables have been considered: the number of children in a group (fewer than 20, more than 20); and the years of working experience (fewer than 10, more than 10). The following hypotheses have been defined: It is assumed that pre-school teachers most frequently resort to e-portfolio to monitor children's personal growth and behaviour; It is assumed that a showcase e-portfolio is the prevailing type used by pre-school teachers in working with pre-school children.

The research included 138 pre-school teachers from the city of Pirot, Serbia. Out of the total number of respondents, 119 pre-school teachers (86,2%) work in a pre-school group with more than 20 children, while 19 pre-school teachers (13,8%) work in groups with fewer than 20 children. The research included 88 pre-school teachers (63,8%) who have more than 10 years of working experience and 50 pre-school teachers (36,2%) with less than 10 years of working experience.

For the purposes of the research, a five-point Likert-type rating scale was constructed in electronic form, divided into two subscales according to the defined research tasks. The scale termed "Educators' Experiences with the Use of E-Portfolios in Working with Pre-school Children," contained 5 categories with which pre-school teachers could express their level of agreement: 1 – strongly disagree; 2 – disagree; 3 – neutral; 4 – agree; 5 – strongly agree. Respondents filled out the scale through the Google Forms application. The calculated value of the Cronbach's Alpha test is ($\alpha > .70$, $\alpha = .81$), which indicates that the constructed instrument is reliable.

For the purposes of data analysis, the statistical programme IBM SPSS Statistics 20 was used. When it comes to statistical parameters, the frequencies of the responses, the arithmetic mean of the responses, the standard deviation, statistical significance, and the t-test have been determined.

The Results

The results obtained by applying descriptive statistics indicate that the arithmetic mean of obtained answers for specific assertions (*I use e-portfolio as a tool of communication with parents; By using e-portfolio in working with pre-school children I discover children's talents and abilities*) is around 3, and the deviation from the average responses (SD) is around 1. Accordingly, one can assert that pre-school teachers depict their experiences by expressing a neutral attitude towards the afore-mentioned assertions (Table 1). According to results which have also been presented in Table 1, one can assert that the values of arithmetic mean established by analysing the responses to assertions: „*I use e-portfolio to preventively act upon suppressing undesirable behaviour*“ and „*I believe that one can prevent aggressive behaviour based on the data that I record in the e-portfolio*“ is around 4, which means that respondents expressed a high level of agreement with these assertions.

Based on pre-school teachers' experiences, 42% of respondents use e-portfolios to communicate with parents, while 53,6% of pre-school teachers use e-portfolios to prevent undesirable behaviour, and 60,1% state that the use of e-portfolios are oriented towards monitoring a child's personal growth and behaviour, which is indirectly useful when it comes to the process of preventing aggressive behaviour

Table 1*Pre-school teachers' experiences with the implementation of e-portfolios in pre-school settings*

Assertion	M	SD	1	2	3	4	5
I use e-portfolio as a tool of communication with parents	3.76	1.40	13.0	7.2	12.3	25.4	42.0
E-portfolio is an important tool for monitoring the overall growth of pre-school children	3.58	1.18	6.5	11.6	26.1	29.0	26.8
By using an e-portfolio in working with pre-school children I discover children's talents and abilities	3.15	1.09	7.2	19.6	34.8	27.5	10.9
I use e-portfolios to work on the prevention of undesirable behaviour	4.04	1.33	10.9	4.3	8.7	22.5	53.6
I believe that one can prevent aggressive behaviour based on the data that I record in the e-portfolio	4.25	1.17	6.5	3.6	8.7	21.0	60.1

According to the assumption that there are differences in pre-school teachers' responses based on the number of children in the group they work with, in Table 2 one can encounter the obtained results which indicate the differences in respondents' answers regarding this variable. One can assert that there is a statistically significant difference in pre-school teachers' responses ($t(38.42) = 3.03$; $p < 0.05$; $p = 0.02$) concerning the use of e-portfolio as a tool of communication with parents. Based on average values of arithmetic mean ($M = 4.37$), one can conclude that pre-school teachers who work with a smaller number of children in a group (fewer than 20) use e-portfolio more frequently to communicate with parents in comparison with pre-school teachers who work with a larger number of children in a group ($M = 3.66$). The results also indicate that pre-school teachers who work with smaller groups of children use e-portfolio more frequently to act in a preventive manner against undesirable behaviour in children ($t(4.45) = 2.31$; $p < 0.05$; $p = 0.00$). Furthermore, pre-school teachers who work with a smaller number of children in a group express a higher degree of agreement with the assertion stating that they use e-portfolios to monitor the personal growth and behaviour of children which in turn enables them to work on preventive measures against aggressive behaviour in children ($t(65.37) = 3.22$; $p < 0.05$; $p = 0.03$) (Table 2).

Table 2*Pre-school teachers' experiences with the implementation of e-portfolios in pre-school settings concerning the number of children in the group*

Assertion	N of children in a group	M	SD	t	df	p
I use e-portfolio as a tool of communication with parents	Fewer than 20	4.37	0.83	3.03	38.42	0.02*
	More than 20	3.66	1.45			
E-portfolio is an important tool for monitoring the overall growth of pre-school children	Fewer than 20	3.84	1.12	1.04	136	0.642
	More than 20	3.54	1.19			
By using an e-portfolio in working with pre-school children I discover children's talents and abilities	Fewer than 20	3.58	0.91	1.86	136	0.518
	More than 20	3.08	1.10			
I use e-portfolio to work on the prevention of undesirable behaviour	Fewer than 20	4.68	0.47	2.31	4.45	0.00*
	More than 20	3.93	1.40			
I believe that one can prevent aggressive behaviour based on the data that I record in the e-portfolio	Fewer than 20	4.68	0.47	3.22	65.37	0.03*
	More than 20	4.17	1.23			

*There is a statistically significant difference in respondents' answers

Table 3 shows the results relating to pre-school teachers' experiences concerning the use of e-portfolios relative to their years of experience. Based on the obtained values ($t(136) = 2.03$; $p < 0.05$; $p = 0.03$), one can assert that pre-school teachers who have less than 10 years of experience use e-portfolios more frequently to communicate with parents. According to the obtained results, no statistically significant differences have been found in other assertions, and the obtained values can be found in Table 3.

Table 3

Pre-school teachers' experiences with the use of e-portfolios in pre-school settings concerning years of work experience

Assertion	Years of work experience	M	SD	t	df	p
I use e-portfolio as a tool of communication with parents	Fewer than 10	4.08	1.26	2.03	136	0.03*
	More than 10	3.58	1.45			
E-portfolio is an important tool for monitoring the overall growth of pre-school children	Fewer than 10	4.06	1.06	3.74	136	0.11
	More than 10	3.31	1.18			
By using an e-portfolio in working with pre-school children I discover children's talents and abilities	Fewer than 10	3.48	1.07	2.73	136	0.36
	More than 10	2.97	1.05			
I use e-portfolio to work on the prevention of undesirable behaviour	Fewer than 10	4.22	1.65	1.22	136	0.13
	More than 10	3.93	1.42			
I believe that one can prevent aggressive behaviour based on the data that I record in the e-portfolio	Fewer than 10	4.36	0.94	0.86	136	0.09
	More than 10	4.18	1.28			

*There is a statistically significant difference in respondents' answers

Concerning the prevailing type of e-portfolio that pre-school teachers use in working with pre-school children, one can notice higher levels of agreement with those assertions which describe the prevailing use of an in-depth assessment e-portfolio which pre-school teachers find useful to monitor children's personal growth and behaviour ($M(1.26) = 4.18$), as well as the prevailing use of documentation e-portfolio (formal documentation for each child) ($M(1.06) = 4.19$). Out of the total number of respondents, 58% strongly agree with the assertion that they use an in-depth assessment e-portfolio, and 50.7% of respondents resort to the documentation e-portfolio to keep formal records for each child in their pre-school group (Table 4).

Table 4

Pre-school teachers' experiences concerning the prevailing type of e-portfolio

Assertion	M	SD	1	2	3	4	5
I create a comprehensive e-portfolio for each child (collecting all their outputs).	3.20	1.39	10.1	28.3	22.5	10.1	29.0
I prefer a showcase e-portfolio (featuring only the best outputs).	3.60	1.38	12.3	11.6	13.8	18.3	34.1
I maintain a subject-specific e-portfolio (tracking progress in a specific area).	3.35	1.04	5.8	12.3	34.8	34.8	12.3
I keep a formal-documentation e-portfolio.	4.19	1.06	4.3	2.9	13.0	29.0	50.7
I use an in-depth assessment e-portfolio.	4.18	1.26	9.4	2.9	5.8	23.9	58.0

Based on the data presented in Table 5, one can notice that pre-school teachers who work with a smaller group of children (fewer than 20) dedicate more attention to the creation of an in-depth assessment e-portfolio ($t(99.72) = 5.17$; $p < 0.05$; $p = 0.00$), whereby the arithmetic mean of obtained responses is $M(0.37) = 4.84$.

Table 5*Pre-school teachers' experiences with the prevailing type of e-portfolio concerning the number of children in the group*

Assertion	N of children in a group	M	SD	t	df	p
I create a comprehensive e-portfolio for each child (collecting all their outputs).	Fewer than 20	3.26	1.48	0.22	136	0.30
	More than 20	3.18	1.38			
I prefer a showcase e-portfolio (featuring only the best outputs).	Fewer than 20	3.47	1.58	-0.43	136	0.25
	More than 20	3.62	1.35			
I maintain a subject-specific e-portfolio (tracking progress in a specific area).	Fewer than 20	3.73	0.73	1.73	136	0.07
	More than 20	3.29	1.07			
I keep a formal-documentation e-portfolio	Fewer than 20	4.52	0.70	1.50	136	0.13
	More than 20	4.13	1.10			
I use an in-depth assessment e-portfolio	Fewer than 20	4.84	0.37	5.17	99.72	0.00*
	More than 20	4.07	1.31			

*There is a statistically significant difference in respondents' answers

Statistically significant differences have not been detected when it comes to pre-school teachers' experiences relating to the prevailing type of e-portfolio applied in their pre-school institution relative to the years of experience.

Discussion

The results obtained in the course of this research indicate that the majority of pre-school teachers who took part in the research believe information collected in the e-portfolio can be used to monitor children's personal growth and behaviour and, consequently, prevent aggressive behaviour. If one considers the current problem relating to negative forms of behaviour, with special emphasis on aggressive behaviour in pre-school children, one can assert that collecting notes, creative work, drawings, video clips, anecdotal notes and other materials, can be observed as a potential manner of defining and taking preventive measures against negative behaviour. This interesting information in correlation with the variable relating to the number of children in a pre-school group indicates that pre-school teachers who work with a smaller number of children in a group use e-portfolios more frequently to monitor children's personal growth, learning and behaviour. This information can be interpreted from the standpoint of job overload and the priority work obligations that teachers have. Accordingly, it is believed that when a group is smaller it allows the pre-school teacher to dedicate enough time to create e-portfolios in addition to other mandatory activities, as well as to analyse the material and take potential measures to prevent undesirable behaviour. Previous research studies (for instance, Eynon & Gambino, 2017; Katz et al., 2014), confirm the findings obtained through this research, i.e. they confirm that e-portfolio is a frequently used tool to monitor children's personal growth, meaningful learning and behaviour in a pre-school institution.

By analysing the research results the authors could infer that younger pre-school teachers (with less than 10 years of experience) use e-portfolio more frequently as a tool of communication with parents. This particular information can be justified if one considers that younger pre-school teachers have more enthusiasm, motivation, and abilities to resort to digital technologies, as well as better organisation skills to work with pre-school children. The results show that pre-school teachers who work with fewer children in a group (fewer than 20) are readier to communicate with parents in such a fashion. Interpretation of this result can be observed from the standpoint of time that a pre-school teacher can dedicate to each child, as well as to each e-portfolio. Considering that a smaller number of children in the group contributes to a better management of time, space and activities through projects, a pre-school teacher during the working day can dedicate more time to updating the e-portfolios of each child.

It is believed that the material introduced to the e-portfolio in a timely fashion provides parents with an insight into activities performed at a pre-school institution, and owing to information technologies parents can maintain communication with a pre-school teacher when it comes to their child's activities, personal growth, behaviour and overall progress. Similar results have been obtained in some previous research studies (Penman, 2014; Higgings, 2015; Gallagher, 2018). For instance, in the research performed by the author Higgings (Higgings, 2015), the results indicated that the use of e-portfolios significantly helped pre-school teachers to establish and strengthen the communication

between the kindergarten and family. Furthermore, parents and members of the family confirmed that the e-portfolio helped to a large extent to understand children's activities in kindergarten, to follow their growth and to observe potential risks of undesirable behaviour. Likewise, interesting results obtained through another research indicate that 100% of pre-school teachers recommend the use of e-portfolios (Penman, 2014).

Pre-school teachers who work with a smaller group (fewer than 20 children) most frequently resort to the in-depth assessment e-portfolio. Considering the features of this type of e-portfolio, one can assert that pre-school teachers believe that a minute record-keeping and collection of other sorts of materials with the purpose of introducing them into individual e-portfolios represents an important tool for continuous monitoring of children's personal growth and behaviour. Accordingly, pre-school teachers invest a lot of time to produce this type of e-portfolio. This information is rather significant for the educational practice and it can be recommended to others as an example of good practice. A detailed record-keeping of the material in an electronic form is easily available to all participants in the process of education (pre-school teachers, educational specialists, parents, children) and they provide a good basis for a discussion on learning, progress and behaviour of each child. Accordingly, updating information and material is rather significant for observing the changes in children's personal growth and behaviour.

The research has shown that the other prevailing type of e-portfolio used by pre-school teachers is a documentation e-portfolio. It is believed that keeping formal documents on a child's presence and other supporting data only supplements the in-depth assessment e-portfolio. A larger number of respondents resort to the showcase e-portfolio, i.e. they are dedicated to collecting only the best outputs of each child. Based on the obtained results, pre-school teachers' experiences show that subject-specific e-portfolios are the least frequently used in practice. Hence, pre-school teachers do not tend to follow a child's progress in one particular area.

This research has been implemented by resorting to an assessment scale. Hence, the limitations of this research can be perceived in the lack of an interdisciplinary approach to the problem, as well as in the use of a single instrument. Likewise, the number of filled-in instruments encompassed by the research is smaller in comparison with the received responses due to inadequately filled questionnaires. The implications for some future research could be oriented towards exploring the methods of creating an e-portfolio, the inclusion of children in creating the e-portfolio and the like. Furthermore, an e-portfolio could be suggested as the basic manner of record-keeping, should a research study on a sufficient number of respondents establish that an electronic version is easier to apply from the standpoint of pre-school teachers, children and parents.

Conclusion

The digital revolution and its continuous flow resulted in pre-school children being able to easily and quickly interact with digital technology. The use of digital tools in the process of education was a response to a need for a quicker, more economical, safer and modern manner of record-keeping and collecting materials. E-portfolio, as one of the innovative tools represents significant progress in the process of innovation of a pre-school institution because it provides various possibilities, it is a more interesting and easier channel of communication compared to papers and file organisers.

Considering the different experiences and expectations of pre-school teachers, it is important to emphasise that younger pre-school teachers are more dexterous in using digital technologies, as well as more motivated to use e-portfolios. The number of children in the group is also essential. Working in smaller groups gives a pre-school teacher sufficient time to be more thorough in monitoring children's personal growth, learning and behaviour by resorting to e-portfolios. Although an e-portfolio is not a mandatory manner of keeping records and monitoring children's personal growth, learning and behaviour, one can assert that pre-school teachers are already using it in practice. Accordingly, one can assert that there is a firm basis for further development of digital competencies of pre-school teachers, as well as a wider use of e-portfolios in working with pre-school children.

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