COMPUTER ATTITUDES AND COMPUTER LITERACY LEVELS RELATIONSHIPS

MEĐUSOBNI ODNOS STAVOVA PREMA UPORABI RAČUNALA, RAZINA RAČUNALNE PISMENOSTI I ČIMBENIKA SOCIJALIZACIJE

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A b s t r a c t

Increasing numbers of educational strategies are appearing which emphasize the importance and role in the use of ICT (information and computer technology). It has therefore become necessary to create foundations for reaching early computer literacy in the educational curricula of pre-school children. Since problems and doubts in the justification of computer use by pre-school children are so frequently emphasized, children's attitudes towards using them are important as is the provision of an adequate, encouraging and well-directed environment (social agents). It is particularly important for this age group that foundations for recognizing the computer are set up regarding such use as not just a source of entertainment but as a means of work and learning whilst taking into consideration that children should, at the same time, enjoy this work. This paper presents results concerning the attitudes of pre-school children aged between 5.5 and 6.5 towards using computers and, in particular, the elements of computer importance, computer enjoyment and their relative creative tendencies. Technology, in terms of the children's' computer literacy, was questioned using elements including the Windows operating system commands, window manipulation, keyboard use etc. The Social environment (social agents linked to the use of the computer by pre-school children) have been analyzed as a source of initial knowledge about the computer using such questions as: "Who has taught you how to use the computer?" The results achieved by questioning the children's' computer attitudes show that they like using computers, they consider it a very important means of learning and think that possessing computer skills will help them get a better job in the future. The most common sources of initial computer knowledge include input from parents, siblings and friends, a few children learned how to use the computer by themselves. The results of the computer literacy assessment show that children possess a level of basic knowledge expected of this age group. Inter-correlation among the questioned variables show there to be a statistically significant correlation among the computer literacy level, computer importance and computer enjoyment initiated by the social agents.

S a ž e t a k

Sve je više nacionalnih obrazovnih strategija koje već u obrazovnim programima za djecu predškolske dobi naglašavaju važnost i ulogu korištenja informacijskih tehnologija tj. stvaranja osnova za postizanje rane računalne pismenosti. Često se ističu problemi i sumnje u opravdanost korištenja računala u predškolskoj dobi te su bitni stavovi djece prema korištenju računala i odgovarajuća, poticajna i usmjeravajuća okolina tj. čimbenici socijalizacije. Naime važno je da se u toj dobi postave temelji za shvaćanje računala ne samo kao izvora zabave već i kao sredstva za rad i učenje vodeći računa da djeca pri tome i uživaju. U radu su prikazani rezultati ispitivanja stavova djece predškolske dobi (5.5 do 6.5 godina) prema računalu, na osnovu procjene elementa važnosti računala, ugodnosti korištenja računala i kreativnosti. Tehnološka – računalna pismenost djece ispitana je kroz elemente kao što su naredbe Windows operacijskog sustava, rada s prozorima, korištenje tipkovnice, itd. Socijalna okolina tj. čimbenici socijalizacije povezani s korištenjem računala kod djece predškolske dobi ispitani su kao izvori inicijalnih znanja o računalu (pitanje Tko te naučio kako koristiti računalo?). Dobiveni rezultati ispitivanja stavova djece prema računalu pokazuju da djeca vole koristiti računalo, smatraju računalo vrlo važnim sredstvom učenja i misle da će im računalne vještine pomoći kako bi u budućnosti dobili bolji posao. Kao izvori inicijalnih znanja o korištenju računala najčešće se navode roditelji, braća i prijatelji, dok je manji broj djece samostalno naučio osnove rada na računalu. Rezultati procjene računalne pismenosti ukazuju da djeca posjeduju osnovna znanja o korištenju računala za ispitivanu dob. Među ispitanim varijablama računalne pismenosti, važnosti računala i ugodnosti korištenja računala potaknute od strane čimbenika socijalizacije dobivene su statistički značajne korelacije.

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Introduction

In those contemporary societies which are based on information technologies, the importance of computers is emphasized in children at an early age, this can be noticed in the educational curriculum of preschool children. Technology literacy has been included into the National Technology Educational Standards /**1**/ or parts of the National Curriculum /**2**/. In some national educational initiatives /**3**/, a lower level of ICT (information and communication technology) use has been identified in pre-school education, compared to the ICT use in schools of the other levels. Therefore, the goals set out in the use of ICT in preschool education plans include the following:

1. The installation of a variety of ICT equipment in kindergartens;
2. The provision of training programs on ICT use for in-service and prospective kindergarten teachers and the development and distribution of educational materials for ICT use in /**3**/.
3. At school level, there are more detailed technology curricula for kindergarten, preschool children (e.g. /**4**/ /**5**/).
4. Kindergarten Technology Curriculum Objectives are to introduce basic computer skills through Internet games, reinforce Kindergarten skills through integration and to develop an appreciation of/excitement for computer usage /**4**/.
5. The education sector development plan for 2005 – 2010, a part of Croatian National Educational Standard developed by the Ministry of Science, Education and Sport /**6**/, anticipated the application of ICT not just in the first year of primary school but as early as the kindergarten years /**7**/.

It also warned about the problems related to use of computers in these environment: teacher training, parents' ICT competence, and ICT leadership. Therefore, early childhood educators and leaders play important roles in this new technological age /**8**/, and particular attention should be paid to parents' education because an average child spends more hours per week playing and working with multimedia (games, television, music players, cell phones, and so on) than in school /**9**/. The results showed that pre-school children spend over 20 hours per week using various media (video, audio/CD, children's magazine, radio, TV, picture books/books, computer) at home and in the kindergarten /**10**/. As per Gimbert & Cristol /**11**/, studies by Guthrie and Richardson /**12**/ and Talley et al. /**13**/ concluded that children were intrinsically motivated to use computers and these researchers claimed that children spent longer and more focused sessions at a computer than they did in other non-computer-related activities**.** Clements' research /**14**/ indicates that computers can serve as potent catalysts in the development of creativity. Computers also appear to be highly motivating for young children. They generally have very positive experiences with computers and tend to stay focused on a task for a long period of time /**15**/. Children who had access to a computer performed better on measures of school readiness and cognitive development /**16**/. The social environment is crucial for developing a child's habit of (early) computer use. Studies in this area emphasize the importance of parents' attitudes about using computers at such an early age. The majority of parents reported that they viewed computer use as mostly helpful (72% of total sample). Parents whose children spent the most time playing computer games were more likely to perceive the computer as beneficial to their (the children's') learning although the direction of this relationship is still unclear /**17**/. Children whose older siblings use computers at home are themselves more competent. /**18**/. Therefore this paper analyses sources of encouragement in the use of computers in pre-school children. This paper also shows the results related to various aspects of perception of computers in pre-school children expressed by their computer attitude. According to Fishbein and Ajzen /**19**/ attitudes can be divided into a "trilogy of affect, cognition and conation". Affect refers to a person's feelings towards and evaluation of some object, person, issue or event. Cognition denotes his knowledge, opinions, beliefs, and thoughts about the object. Conation refers to his behavioral intentions and his actions with respect to or in the presence of the object /**19**/. In addition, the authors separate the conation component into conation as behavioral intentions and behavior as observed through action. Emerging new technologies now require that children must learn new literacies in order to interact with them. An overview of these new literacies can be seen in the article "Information and digital literacy: a review of concepts" by Bawden /**20**/. The paper reports on the terms of information literacy, computer literacy (synonyms – IT, information technology, electronic, electronic information literacy), library literacy, media literacy, network literacy (synonyms – Internet literacy, hyper-literacy) and digital literacy (synonym – digital information literacy). Thus, in addition to basic literacy, children are now required to gain proficiency in the emerging literacies arising from the modern digital environment in which we live. Owing to the extensive research scope a battery of questionnaires has been devised, comprising "The Young Children's Computer Inventory" /**21**/, used

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with permission of the authors in the research, and "The Information literacy questionnaire D", Kirinić & Vidaček-Hainš. These instruments were used to investigate:

1) Computer Importance ("The Young Children's Computer Inventory" /**21**/), as a perceived value or the significance of knowing how to use computers and Computer Enjoyment as an amount of pleasure derived from using computers /**22**/;

2) Computer Enjoyment ("The Young Children's Computer Inventory" /**21**/) as the effect component and Computer Importance as the cognition component of the (computer) attitude.

3) Information and computer literacy in the kindergarten ("The Information literacy questionnaire D", Kirinić & Vidaček-Hainš) expressed as an ability: to identify the physical components of a computer system (monitor, keyboard, etc.), to switch a computer on and off, to launch and exit software, to locate and use letters, numbers and special keys on the keyboard, to demonstrate appropriate mouse manipulation, to place the cursor at a specified location, to use a mouse to select words and to type words and numbers /**23**/.

4) Technology literacy ("The Information literacy questionnaire D", Kirinić & Vidaček-Hainš) analyzed through such components as tools - software, hardware, ethic, etiquette and production /**24**/. It is because every student deserves a wide range of educational experiences with various types of hardware and software and students should be thoroughly grounded in both the ethics and etiquette of technology use and should have frequent opportunities to use technological tools to create their own information artifacts — in print, on the screen, and online /**24**/. Based on the stated research, the goals of this paper are to examine the relationships among variables of self-perception of computer importance, computer enjoyment and creative tendencies. It has also evaluated the ways in which an encouraging social environment can impact upon the familiarization with IT literacy elements.

Research Methods

a) Respondents

The research included 32 pre-school children from 5.5 to 6.5 years of age, all attending the regular pre-school curriculum of the "Bubamara" Kindergarten in Gornji Kneginec (Croatia). The sample gender mix was 63% girls and 37% boys. The majority of the children have access to a computer at home (almost 80%) and all have access to a computer in the kindergarten. The research was conducted in the spring of 2007. Prior to starting the research, written approvals were obtained from parents who allowed the children to be interviewed. The interviews were conducted in the way teachers would read to each child individually by making one statement at the time, including both measuring instruments, thus requiring the child to provide an answer.
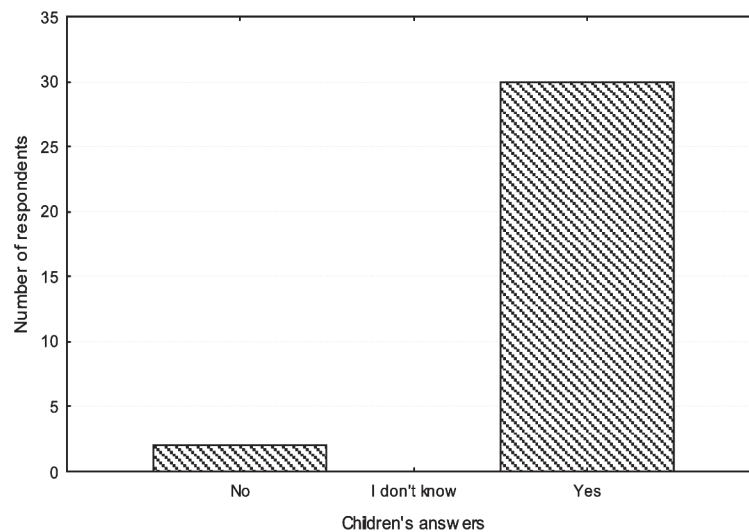
b) Tools

1. The Young Children's Computer Inventory (YCCI-v5.14) /**21**/: The first and the fourth part of the questionnaire used relates to questions about attitudes towards use of computers. One part consists of 11 items of the Likert Scale and enables self-evaluation of computer importance (the perceived value of significance of knowing how to use computers) and computer enjoyment (the amount of pleasure derived from using computers). Another part of the original questionnaire consists of 27 items whose questions have also been defined as the Likert Scale and are intended for the self-evaluation of creative tendencies (inclinations toward exploring the unknown, taking individual initiative and finding unique solutions).

2. The Information literacy questionnaire (D) is intended to evaluate the competence in working on a computer and was composed for the purposes of this research by the authors Kirinić, V. and Vidaček-Hainš, V. /**10**/ /**18**/ /**25**/. The measuring instrument consists of 18 questions evaluating the technology literacy as a constituent part of information literacy following the Ferguson model /**24**/. The tasks relate to the naming of particular computer parts, knowing commands of the Windows OS, knowing how to use the keyboard and searching effectively on the web. This questionnaire has also been intended to evaluate the social component in children's use of computers. To that end, there are included such questions as: "who taught you how to use a computer?" or "who helps you when you don't know something?"

Results and Interpretation

Categories of evaluating children's' attitudes towards computers included their self-evaluation of use enjoyment and computer importance. Based on the results collected by the Young Children's Computer Inventory /**21**/ it is clear that children like and enjoy using computers (computer enjoyment). To illustrate, Figure 1 shows the distribution of their answers to one of the questions in the computer enjoyment category, clearly indicating they like using computers (90.6%).

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Figure 1: Attitudes towards computer use (enjoyment): I enyoj doing thing on the computer

In addition to the component of computer enjoyment, we wanted to know whether children's' perception included the importance of using computers, not only as a means of entertainment but for other purposes (business, studying, etc.). Figure 2, shows answers to one of the questions in the computer importance category, making it clear that, according to their evaluation, the computer is a very important means of studying (84.4%). It is also interesting to notice that almost 50% of children of this age think that if they learn how to use the computer they will be able to get a better job. Considering these are respondents who have not yet started primary school, this detail points to a clear perception of the importance of acquiring knowledge and skills of computer use.

FIgure 2: Attitudes towards computer use (importance): I can learn many things when I use a computer
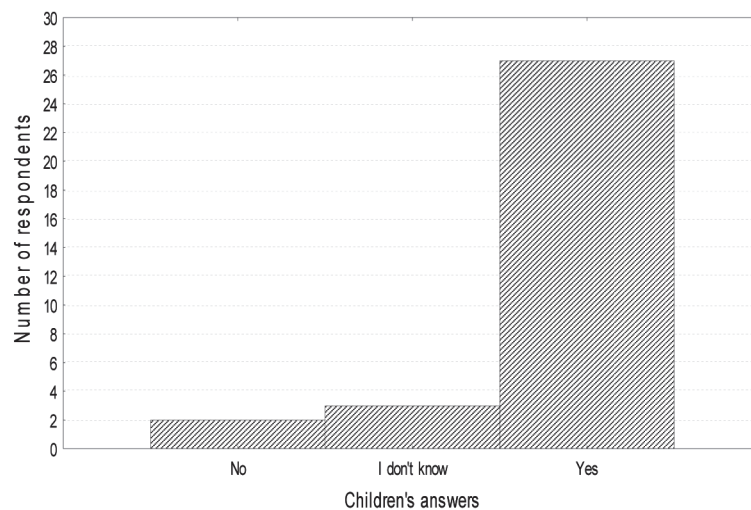
Most information about using computers is provided to children by various social environment factors, i.e. social agents (parents, olde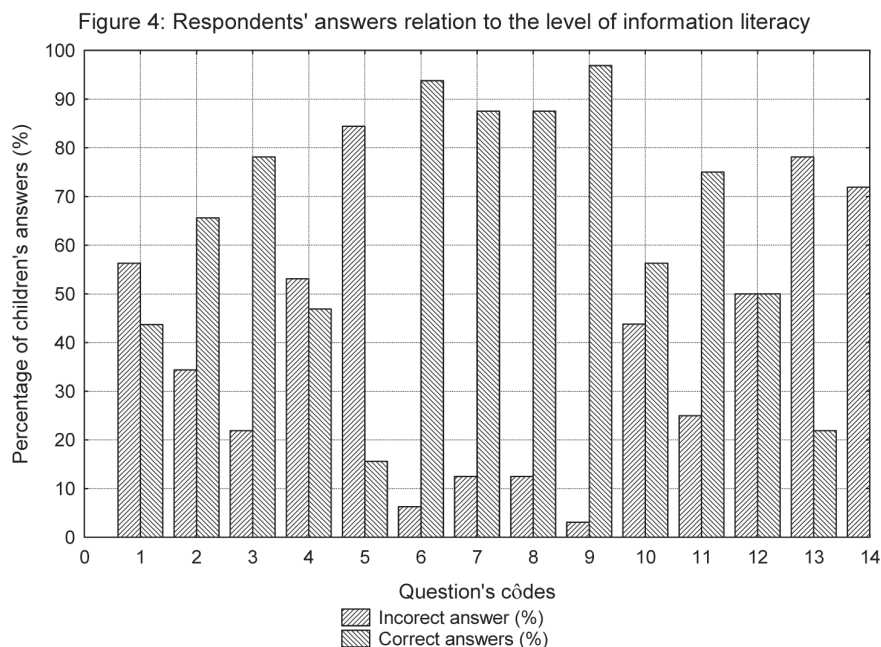r siblings, peers, teachers…). These results demonstrate the above stated social agents play the most important role in acquiring the fundamentals of information literacy (Figure 3).

Figure 3: Social agents: Who has taught you how to use the computer
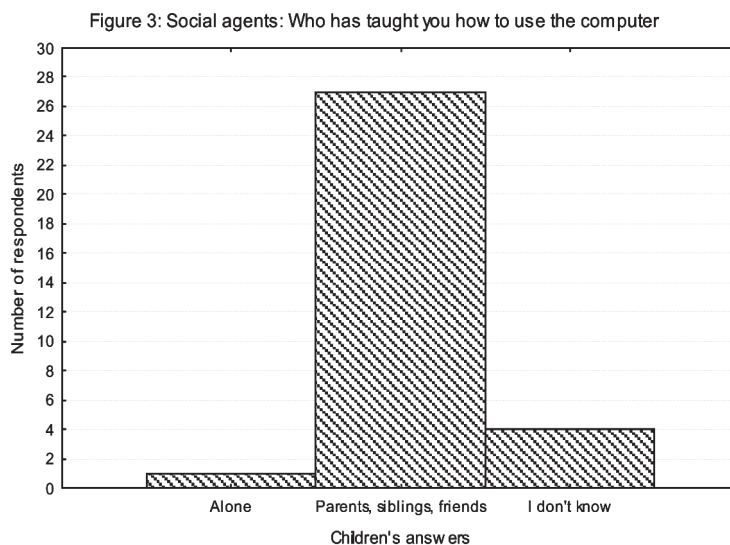
In the second part of our research, after having evaluated attitudes related to use of computers, we also evaluated the level of information literacy in order to receive true information on how much the respondents really know about working with computers. In our Information Literacy Questionnaire – D, we set problems which had to be solved (a picture-type problem, to be solved by a paper and a pencil) relative to their acquaintance with software and hardware, OS commands,

keyboard and using the web (browser/search engine Google).

The respondents' answers are listed in Figure 4. These show that children have mostly acquired fundamental information literacy, they are familiar with and correctly use computer commands, recognize and know the function of basic hardware elements and start learning concepts related to searching for information on the web (browser/search engine).

Figure 4: Respondents' answers relation to the level of information literacy

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Legend for figure 4:
a) Window manipulation: 1= Window minimization (icon function recognition); 2= Window maximization (icon function recognition); 3= Window closing (icon function recognition);
b) Windows operating system: 4= Print (icon function recognition); 5= Save (icon function recognition); 6= Shut down (among many options selecting the right icon);
c) Media and mouse manipulation: 7= DVD/CD-ROM - DVD/CD-ROM drive association; 8= Floppy disc - floppy drive association; 9= Mouse - pointer (linking) association (naming the mouse);
d) Special keys on a keyboard: 10= ESC (escape) button (to exit software/game); 11= Space button (to insert space between letters/words);
e) Web (usage): 12= Level of recognizing the browser/search engine (Have you seen this before?); 13= Level of naming the search engine (What is it?); 14= Level of pragmatism (What is it used for?).

Mutual interrelations among variables of computer importance, computer enjoyment and creative tendencies have been identified (Figure 5). Results show there to be a statistically significant connection between self-evaluation of computer importance and computer enjoyment (r=0.505, p<0.05), that is, children who more enjoy using the computers also value the awareness of how to use

them to a higher level. A statistically significant negative connection has been identified between self-evaluation of computer enjoyment and creative tendencies (r= -0.403, p<0.05). This data is interesting in the sense that the more creative children do not enjoy using computers as much as do their less creative peers. This is probably because the former are able to create other activities unrelated to computers. Interconnections have been identified between: the encouraging social environment variable in early computer use with pre-school children and computer importance, computer enjoyment and creative tendencies self-evaluation variable, as well as technology literacy as an element of information literacy. The resulting outcome was a statistically significant positive correlation between the evaluation of the social component during the use of a computer (based on children and parents', brothers or sisters' time spent together when they use the computer) and the computer enjoyment component (r= 0,393, p<0.05). Statements and questions included in the technology literacy evaluation questionnaire specifically related to the evaluation of the level of acquaintance with computer parts, the "tools technology literacy", which included hardware, software and the Internet i.e. web /**24**/.

Figure 5: Interrelations among attitudes of the respondents towards computers, social agents (social environment factors) and information literacy.
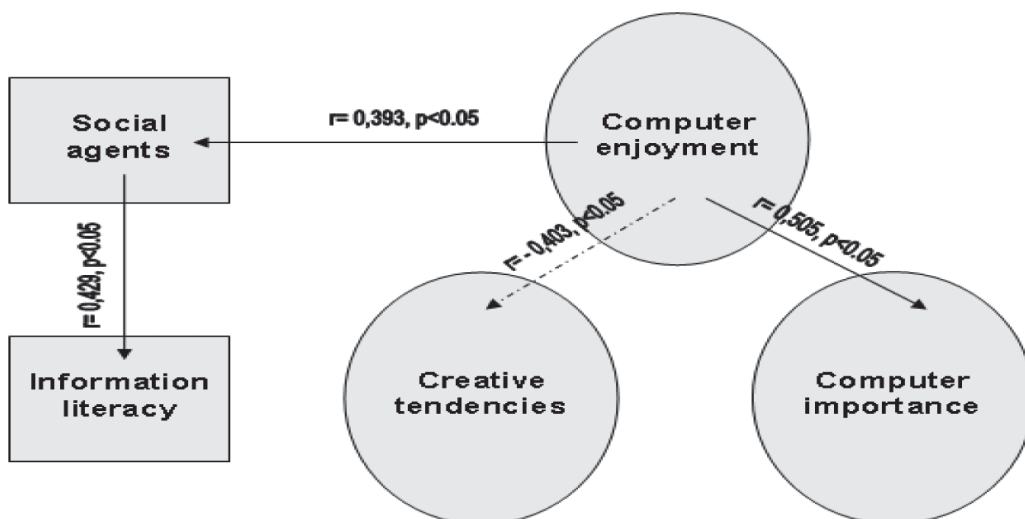
Legend: " ____ " = statistically significant positive and " .... " negative correlation

Even more interesting is the role which other social agents (parents, siblings and peers, teachers, etc.) may have in relation to use of a computer (correlation r= 0,429, p<0.05). This statistically significant Pearson's correlation shows the importance of learning about how to use a computer in an encouraging social environment. In other words, children who received their fundamental knowledge about information literacy with the help of their parents, older siblings or teachers show a higher level of technology literacy as a part of their information literacy, following the Ferguson model /**24**/. They are better at naming certain computer parts, they are more aware of OS Windows commands, more adept at using a keyboard and have experience in searching the web. Interrelations among the stated variable are shown in Figure 5.

Conclusion

Computer enjoyment, a variable relating to degree of pleasure derived from it's use is connected to incentives from the social environment and the perception of importance of knowing how to work on a computer (computer importance). In other words, this means that the role of parents, teachers, older siblings and peers is of vital importance in learning the first steps of information literacy in the area of software, hardware, use of web browsers, familiarity with the Windows operating system and in keyboard use. Furthermore, the results emphasize the importance of computer software content quality, as the experience of computer enjoyment is closely linked to the perception of computer importance. Interestingly, creative children more often use resources beyond the range of computers and, with them, computer enjoyment is slightly less emphasized than with their peers whose creativity is less developed. Related to this, Han /**8**/ points out that principals, teachers, and parents should: provide technical support and up-to-date pedagogical training, redesign school curriculum planning to incorporate IT as an element of learning and teaching, allow sufficient time for young children to enjoy computer activities, provide on-site technical and teacher training workshops for teaching staff according each kindergarten's own culture and different context, set up a small working group to promote ICT uses in the school, ensure teachers get all IT ready before class to save some waiting time for children, provide parent-child computer activities to enhance better use of ICT and to view the school ICT plans as a whole school plan. The task of all social agents is to influence a new, wider approach to computer use so that, together with other information technology, they provide

different learning spaces and promote discovery, delight, curiosity, creativity, self-expression and pleasure in learning /**26**/.

The received results comprise potential guidelines for preparatory planning to improve researched areas in kindergartens and can be used in presentations and workshops for parents and teachers.

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