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Integrative Education: Teaching Psychology With the Use of Literature and Informational Technology

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In this work, a new method of teaching psychology based on the union of scientific, artistic, and information-technological knowledge is presented. The author teaches Cognitive Development in Early Childhood analyzing Anton Chekhov's short story *Grisha* and uses both traditional and computerized instructional methodology. In the authors' two stages of the study: (1) all the psychological phenomena embodied in Chekov's story were identified; and (2) the effectiveness of traditional and computerized instructional methodologies in students' analysis of the story was compared. According to the results, the story truly embodied some fundamental features of early childhood development. When analyzing the story, online students were more successful: They comprehended new psychological ideas faster and their new skills, developed in the course of solving the task, were more stable. The author concludes that: (1) incorporating literature into psychology courses enhances the students' comprehension of complicated psychological concepts, ideas, and theories; and (2) computerized instructional methodology has a potential for being more efficient than its traditional prototype, because it creates better conditions for development of people's ability for an independent intellectual work as well as goal-oriented and logical thinking.

Keywords: integrative education, distance education, teaching/learning psychology online, computerized instructional methodology, psychology of arts/literature

Introduction

In the 20th century, some outstanding supporters of integrative education argued that it provided learners with a higher competence. They declared integrative education as a synthesis of scientific and artistic knowledge (Dewey, 1916; 1989). Today, we can say with certainty that they were right. Moreover, nowadays, this idea receives a new incentive. Since computers are widely used in all the areas of human activity and technical possibilities of communication are rapidly increasing, the information-technological component becomes an essential part of the integrative approach to teaching and learning as well.

At the same time, being among the most intensively developing industries, the informational technologies transform the face of modern education. Within the last two decades, distance education based on the Internet and interactive computer programs developed along with traditional pedagogical forms. Programs of distance learning are mushrooming around the world involving humanitarian disciplines as well as exact sciences. Transition of such a subject as psychology from a traditional classroom to a virtual one

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seems especially challenging.

This work presents a new method of teaching psychology based on the union of scientific, artistic, and information-technology in its application to online classes.

Fiction stories have been successfully used for teaching psychology and psychoanalysis for a long time (Bettelheim, 1989; Freud, 1933). Some contemporary specialists have also used literature for their educational practices (Boyatzis, 1992; Pitts, 1978; Toom, 2006). However, attempts to create computerized versions of such instructional methodology have been scarce until now. The most popular computerized tools for teaching the subject that can be found on the American market today do not deal with works of fiction. Meanwhile, this idea seems to be quite appropriate for teaching even the most complicated aspects of psychology. We are going to focus on one of them—cognitive development in the early childhood.

Scholars keep telling us how difficult it is to study cognitive functioning of very young children. Textbooks are short of means to present relevant complicated ideas. This drawback may be overcome with help of Anton Chekhov's short story *Grisha* (Chekhov, 1979). This uniquely profound illustration of a two-year-eight-month-old boy's cognitive functioning can help to study the topic much more effectively. The story contains vivid and detailed descriptions of how a child, having just first seen the world after a long cold winter, perceives the new objects and people outside of his nursery room. We are given a window into how he copes with unusual experiences, how he thinks, speaks, forms concepts, and develops a categorical structure of knowledge essential for his further understanding of reality.

The author of this paper has used Chekhov's story for teaching in a traditional classroom successfully for many years. With a transition to distance education, it became necessary to also incorporate this piece of literature into the online courses' curriculum. The main task of the project became to provide the online students with a computerized version of this instructional tool that would be at least as efficient as its traditional prototype.

With this purpose, we conducted a two stage study. In the first stage, we attempted to identify all the psychological phenomena embodied in Chekov's story *Grisha*. In the second stage, we compared the effectiveness of traditional and computerized instructional methodologies in students' analysis of *Grisha*'s perception.

Chekov's *Grisha* as an Illustration of the Child Psychology Theories

At the first stage of the study, 282 graduate students participated while they were taking Dr. Anna Toom's Child Psychology course during the period 2002–2009. The students analyzed the main character's psychological functions and behavioral patterns using scientific definitions and practical criteria of child development.

For convenience, we divided the text into 20 small episodes; each contained one event (sometimes, two meaningfully similar events). Subjects received detailed instructions describing a strategy for the episodes' analysis and criteria for the identification and interpretation of the child's actions: a list of basic emotions, behavioral reactions, and forms of categorization.

The results of this part of the study consisted in the following.

Perception

Eighty-nine percent of the subjects found at least seven out of 13 episodes that illustrated the character's

perception. Perception was easy to identify, because it is based on sensations: "Grisha looks", "Grisha hears", and "Grisha feels hot". Also, it was easy to identify because of its strong connection with the child's motor activity: his need to approach, touch, and take everything new on his way. Thus, the story confirms the theories of Kurt Levin (1935) and Leo Vygotsky (1998).

Categorization

Ninety-five percent of the subjects recognized at least eight out of 11 episodes which showed how Grisha actively categorized the world. He explored and classified everything that he experienced: objects, animals, space, people, and their behaviors as well as his own. Nobody and nothing passed unnoticed by him. Thus, the character's cognitive activity is well consistent with Jean Piaget's theory (Flavell, 1963).

Memory

Ninety-four percent of the subjects found at least five out of seven episodes that showed the character's capability to remember familiar people, things, and events even when they were not before his eyes anymore. Moreover, in these illustrations of the character's memory his object permanence in a progress was easy to guess. No doubt, the story reflects one of the most sophisticated cognitive phenomena discovered by Jean Piaget (Flavell, 1963).

Learning

Ninety-nine percent of the subjects found at least five out of eight episodes that demonstrated *Grisha's* tendency to imitate everything he sees. Ninety-two percent of the subjects found the story episode that showed how punishment influenced the boy's further behavior and social knowledge formation. Therefore, the story supports theories of learning by Skinner (1938) and Albert Bandura (1977).

Speech

Ninety percent of the subjects, when comparing the character's speech with the standards of speech development for 2.5–3-year-olds, found its inconsistence with the boy's age. Indeed, Grisha prefers non-verbal communication, his vocabulary is poor, and he never asks questions (who? what? why? and where?). Unlike most kids of his age, he has difficulty in producing even short four-word sentences. Then, 85% of subjects, after analyzing how the caregivers behaved with Grisha, concluded that the main cause of the boy's speech delay was, obviously, the neglect of his need for emotional communication. We can say that the story supports Renee Spitz's (1945) discovery.

According to these results, Chekhov's story *Grisha* truly embodies some fundamental features of early childhood development elaborated by well-known psychologists. Therefore, the appropriateness of the story as an educational tool for psychology courses was proven.

Comparative Analysis of Instructional Methodologies

At the second stage of this study, the purpose was to compare a computerized instructional tool for analyzing the story with traditional classroom instructions. To accomplish this goal, we attempted to create an adequate methodology that included reasonable and scientifically sound strategies to deal with an artistic text on the basis of both psychological and formal-logical knowledge.

Computerized Instructional Methodology

An interactive computer program guided the user through 20 cycles corresponding to 20 episodes of the

story is shown in Figure 1. The algorithm of the program was built in accordance with the psychological theory of stage by stage formation of mental acts (Galperin, 1969). In every cycle, the user performed a sequence of acts for finding the correct answers for the two main questions: (1) Is the character's perception described in this episode? and (2) If yes, does this description match the theory? The central part of the cycle included a set of auxiliary sub-questions enabling a detailed and in-depth analysis of the episode. These sub-questions decomposed the user's mental act into several more elementary operations. Having performed them and generalized their answers, one could find the correct answers for the main questions more successfully. Even if the user's answers were incorrect, she/he had an opportunity to find out the correct ones and receive accompanying explanations from the program. This interactive computer program was written with the use of ASP.NET (Microsoft Active Server Pages) technology for Web development to produce dynamic Web pages and MSSQL (Microsoft Structured Query Language Server) data base for storing information.

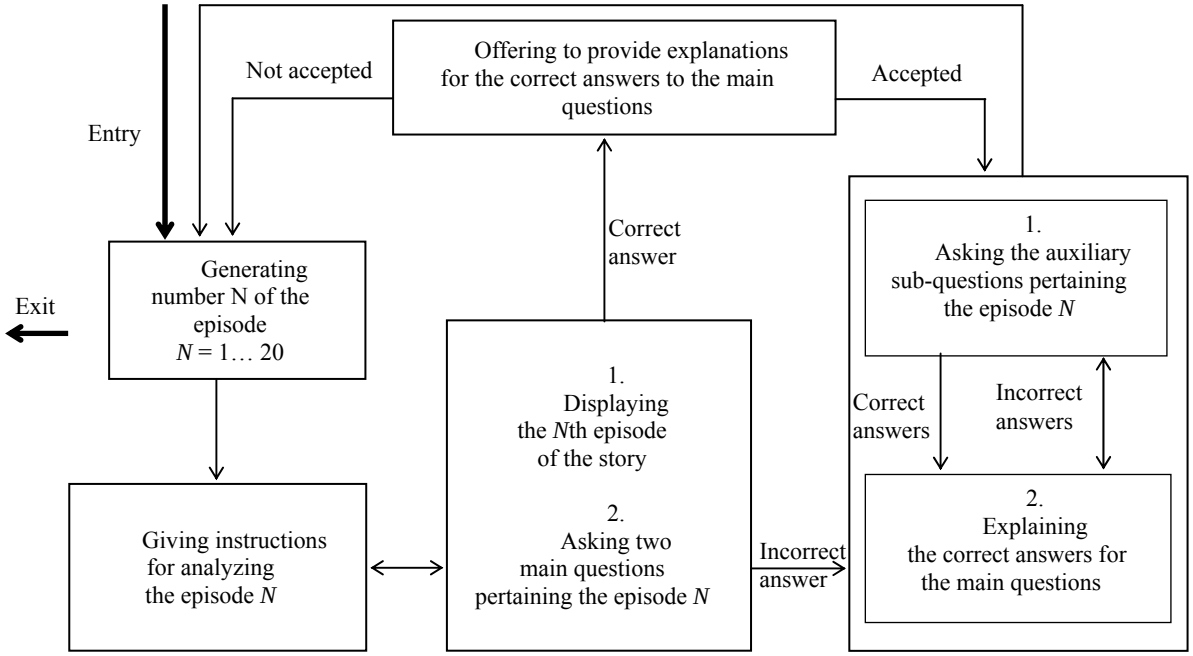

Figure 1. Flowchart of the interactive cycle providing the analysis of each episode of the story.

Research Methodology

At the second stage of the study, 60 subjects participated. They were graduate students who were taking the author's course Child Development and Learning in the Cultural Context. They had a short lecture on the topic of child perception, then were familiarized with Chekhov's story *Grisha*, and finally, were invited to analyze the story's episodes in their chronological orders. Each subject's task was to determine which particular episodes contained descriptions of the boy's perception and whether these descriptions were consistent with the preliminary studied theory according to which perception in very young children is accompanied by strong emotions and followed by an immediate motor activity.

For the study, 30 participants analyzed the story in a classroom while 30 others did it in online classes using the computerized version of this psychological task. All the participants were given the same instructions and suggested one and the same intellectual strategy for performing the task. Students in the

traditional setting wrote their answers in paper forms identical to those forms which the online participants had to fill on their computer screens. Having analyzed an episode and answered the questions about the character's perception, the onsite students were provided with the correct answer and brief explanations by the instructor, while the online students received computerized feedback. The content of the explications was identical in both groups; and the only difference was in the means of communication—oral in the onsite case and displayed on the screen in the online case.

Hypothesis

We considered two indicators of success in performing the task: the quantity of correct answers and the dynamics of learning. We expected that subjects of both groups would answer roughly 50% of the questions; this expectation seemed to be the most unbiased. We also expected that subjects, when analyzing 20 episodes in the course of the study, formed some intellectual skill for solving a certain type of problem, or may be, even a class of analogous problems. Thus, stability in forming this skill might serve as an indicator of successful learning.

Statistical Analysis of the Data

For both groups, we measured the frequency of successful recognition of the main character's perception and stability in forming the skill helping to solve this problem. Since all the students of both groups found more than 50% of the correct answers for every episode, calculation of the average of correct answers (A) for each group was considered sufficient to confirm our first hypothesis. To check the second hypothesis, we calculated the RMSD (root mean square deviation) for each the onsite and online groups. An original formula (Davis & Smith, 2005) was adjusted to our study's specific purpose. We operated with differences between numbers of correct answers given by subjects for the next and the current episodes. The root mean square deviation for the onsite group was calculated by the following formula:

$$RMSD_A = \sqrt{\frac{\sum_{n=1}^{19} (A_{n+1} - A_n)^2}{19}}$$

$RMSD_B$ for the online group was calculated analogously; only the variables *B* were used instead of *A*. The data received are shown in Table 1.

Table 1

Descriptions of Episodes and Results of Students' Analysis of Episodes Listed by Group Type

Episodes of the story		Onsite group		Online group	
Number	Brief content	A_n [b]	$(A_{n+1}- A_n)$ [c]	B_n [b]	$(B_{n+1}-B_n)$ [c]
1	Grisha[a] walks on the boulevard with his nanny	24		27	
2	A rectangular world of Grisha's nursery room is described	23	-1	26	-1
3	Mama, nanny, and cat are described as regular visitors of the nursery room	27	4	28````	-2
4	The dining and living rooms in Grisha's house are described	29	2	29	1
5	Papa is mentioned as a very mysterious person	27	-2	28	-1
6	Auntie, another puzzling person, is mentioned	27	0	29	1
7	In a new world, outside of his nursery room, Grisha meets new people	24	-3	27	-2
8	Grisha sees horses that are absurd for him	27	3	28	1
9	Grisha hears a terrible tramping sound—a crowd of soldiers	28	1	29	1

(Table 1 continued)

10	Grisha hurries after big cats running by and gets a punishment from nanny	28	0	28	-1
11	Grisha takes an orange from the woman-seller without nanny's permission and is punished again	26	-2	29	0
12	Grisha finds a piece of glass and is afraid of taking it	28	2	29	0
13	He meets the man with bright buttons that makes him happy and laughing	29	1	30	1
14	Grisha is taken by his nanny and the man to the cook's room	27	-2	29	-1
15	Grisha suffers from a hot stove	28	1	30	1
16	Grisha observes adults having a meal	26	-2	28	-2
17	He asks and gets a piece of pie and some drink from adults	29	3	30	2
18	Grisha shares his impressions of the day with mama at home	28	-1	29	-1
19	Grisha has an excitement preventing him from sleep	27	-1	29	0
20	After all, he turns out to be sick, and is treated with castor oil by mama	28	1	29	0
			2.0 $RMSD_A$ [d]		1.2 $RMSD_B$ [d]

Notes. a. Grisha is a Russian masculine name, analogous to English Greg, a short for Gregory; b. A_n and B_n are numbers of correct answers given for every episode by the onsite and online students respectively; c. $(A_{n+1} - A_n)$ and $(B_{n+1} - B_n)$ are the differences between numbers of correct answers in the current and the previous episodes in the onsite and online groups respectively; and d. $RMSD_A$ and $RMSD_B$ are the root mean square deviations for the onsite and online groups, respectively.

Results and Their Interpretation

All the subjects studied expressed a belief that in all the episodes, analyzed by them, the main character's perception was consistent with two fundamental theories of perception. First, perception is built on sensations; and Second, in the case of the child, perception is accompanied with strong emotions and is followed by immediate behavioral acts. In the onsite group, the average $A_A = 27$, and in the online group, $A_B = 28.6$ out of 30, the maximal number of correct answers. Thus, Grisha's perception, as described in Chekhov's story was recognized as such with a high frequency by both onsite and online subjects.

The graphic results of the students' analysis of the episodes are presented in Figure 2.

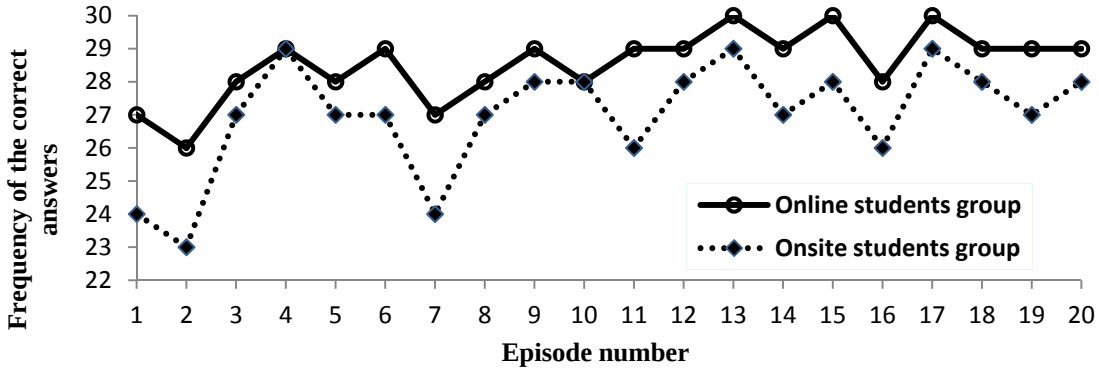

Figure 2. The graphic results of the students' analysis of the episodes.

The vertical axis shows frequency of correct answers from 23 to 30, the minimal and the maximal numbers of the correct answers in this study (23 was given by the onsite group for the second episode). It is evident that the solid black curve keeps above the dotted one. This shows that the online students gave more correct answers at every episode than onsite students. We observe also that the solid curve is smoother than

the dotted one. This is especially noticeable at the episodes No. 2, 7, 11, 16, and 19. Evidently, these episodes were more difficult to interpret than the others. At these episodes, both curves sharply go down, but "downs" of the solid curve are smoother than those of the dotted one. Such kind of smoothness indicates that the online students' learning was more stable and the intellectual skills obtained by them were more reliable than those of the onsite students.

The RMSD applied to the differences in each of the two groups of subjects confirms these suggestions. It is evident that the smaller is the RMSD the more stable and reliable is the intellectual skill obtained in result of the study. The calculation gave the $RMSD_A = 2.0$ for the onsite group, and the $RMSD_B = 1.2$ for the online group. Thus, the online students invariably learned more successfully than onsite ones.

Interpretation of the results is based on the author's many years of work experience as a university professor of psychology and a researcher.

The result obtained may be interpreted based on a comparison of the conditions for intellectual work in the onsite and online classes. First, unlike the traditional classroom, where communication is oral, in virtual classes, students deal with visual information, and it is easier to solve complicated psychological problems when all the problems, instructions, and feedback messages are visually represented; Second, in the traditional classroom, the students' answers, even correct ones, are often intuitive guesses. In contrast, online communication requires more deliberate responses, and the computerized instructions more than traditional ones stimulate students to goal-oriented and focused thinking; Third, a complicated analysis of every story's episode is not accentuated in the traditional classroom, but in the virtual classroom, on the contrary, it has to become more explicit and rationalized due to formal representation of information; and Finally, our computerized instructional tool represents the strategies of intellectual activity needed to reliably obtain correct answers. In the course of the study, the online students learned not only correct answers, but also efficient rules of analysis and how to use these rules in the correct order. Due to the formal procedures, which were performed 20 times, and due to the informative feedback, which was received on each step, the online students mastered the intellectual strategy leading to success. In a traditional classroom, such a detailed training of every student's logical thinking is practically impossible. This explains a greater number of mistakes made by those who analyzed the story in a classroom.

Conclusions

Anton Chekhov's story *Grisha* embodies such fundamental features of toddlerhood and early childhood as: (1) unity of emotion, cognition, and behavior that determine perceptual abilities of the child; (2) intensive categorization of the world; (3) appearance of long-term memory and intensive development of object permanence on the basis of it; and (4) dependence of successful speech development on the child's satisfied need for emotional communication and existence of positive models to imitate. All these important phenomena of development at the early age were recognized with a high frequency by participants of the study. Therefore, the story is a very valuable educational tool for teaching and studying child cognitive development.

Computerized instructional methodology makes the analysis of the story character's psychological functions and behavior more scientific. However, this kind of analysis—rigorous, logical, and following certain explicit rules—does not impoverish the comprehension of artistic literature, as has often been affirmed. On the contrary, the study of psychological features of the little boy, the main character of Chekhov's story,

becomes only more productive if formal rules of analysis are applied. This is still truer since the subject of our study is a two-year-eight-months old toddler, whose inner world is still too spontaneous and fluent for systematic observations and definite conclusions.

Computerized instructional methodology is more laborious, but it has a potential to become more effective than its traditional prototype. If the interactive computer program serving as an instructional tool is well organized, it stimulates students' motivation for independent intellectual activity. Moreover, it provides a possibility for enhancing their learning and development of their goal-oriented and formal thinking.

The integrative instructional methodology, while it combines such exciting things as psychology, artistic literature, and new informational technologies, provides learners with a unique experience. Along with teaching students psychological theories, ideas, and concepts, we also teach them to understand and appreciate a piece of art that illustrates the psychology of a child with a great realism and talent. A piece of artistic literature animates the learning process, brings a positive emotional flavor into it, and enhances the students' comprehension of complicated psychological ideas. Using an exceptionally talented piece of literature for studying psychology fosters people's aesthetical taste and greatly promotes their emotional well-being within both traditional and virtual psychology classes.

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