A Study of Students' Orientation in the Virtual Classroom

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Abstract
One of the most important features determining successful adjustment and learning in the virtual classroom (VCR) is an individual's ability to quickly, independently, and flexibly orient oneself in the new learning environment. It means grasping the idea of information-technological resources as well as the course organization with its academic, administrative, technical, and communicational requirements. In our pilot study, we investigated this ability of twenty five students enrolled in the author's online psychology class. The research methodology included an analysis of the students' preparation for their study and an evaluation of correlations of these data with students' previous online experience as well as academic performance demonstrated in the course. According to the results, 1) positive correlation between students' effective orientation and their academic performance was found, 2) negative correlation between students' orientation and their' online experience was found, and 3) different students' orientation strategies were identified that allow to predict students' success in online classes. The results' reliability was checked and mostly confirmed using a control population of 51 students. We conclude that farther enhancement of the online courses' design should account for the potential difficulties in orientation in the VCR. New forms of instructional support are needed to help online students, especially beginners, obtain adequate knowledge of the VCR and develop skills for orientation and it. A better understanding of the instrument of learning allows for a more productive study of the course subject.

Keywords: online education, virtual classroom, students' orientation in the VCR, orientation strategy

Introduction

Development of Internet-based distance programs which transfer the study of traditional disciplines into non-traditional learning environments is among the most actual tasks of today's education. Now it is possible to teach and study all subjects in asynchronous online classes. Social sciences are studied also with the use of information technology tools. However, mastering these tools may be an uneasy task for those individuals who have a humanitarian mentality and lack technical know-how. If their needs, such as help with adjusting to and orienting in the virtual classroom (VCR), are not met, it can act as a barrier to successful learning.

One of the most important features determining adjustment to the new learning environment is ability to quickly, independently, and flexibly orient oneself in all aspects of this environment. It means grasping the idea of information-technological resources as well as the online course organization with its academic, administrative, and communicational requirements.

This study is about how such a goal is achieved in a population of online students specializing in education.

Theoretical Frame

Orientation in the VCR as the first step to problem solving

George Polya[1], a prominent mathematician and educator, rightfully noticed that problem solving constitutes an integral part of human life. Indeed, whenever humans do not sleep or daydream, and maybe even in such moments, they try to solve some problems. Problems belong to different areas of knowledge. They may be theoretical or practical, and may require a proof or a finding. In spite of differences between problems, solving them fit into the universal procedure which Polya described in his well-known book "How to solve it"[2] (Polya, 1973).

According to Polya, the first stage of solving a problem is "working for its better understanding". Before people start to solve a problem, they have to identify and understand its principal parts: the data, the conditions, and what is unknown. Solvers have to examine many details that eventually will play their role in solving a problem. They have to refine and restate the statement. Only after that it becomes possible to move to the next stages – devising a plan and carrying it out.

This approach seems to be productive for analyzing of how students take a course in the VCR. Orientation in the VCR would correspond to Polya's first stage of the

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[1] George Polya (1887-1985) – born in Hungaria; one of the most influential mathematicians of the twentieth century. Professor of mathematics from 1914 to 1940 at Swiss Federal Institute of Technology in Zurich, Switzerland; from 1940 to 1953 at Stanford University in California, USA; remained Stanford Professor Emeritus for the rest of his life and career. He made fundamental contributions to probability theory, number theory, numerical analysis, and combinatorics. His work in mathematics education and heuristic technique made him an internationally recognized educator. Actually, he is one of the modern founders of the theory of problem solving.

[2] This Polya's book is a perennial bestseller that describes methods of problem solving; it had numerous editions and was translated into many languages.

problem solving. Specifics of orientation in the VCR are in collecting the data needed: they may be not given explicitly, as it happens, for example, in word problems. Typically, they should be found though exploration. It is shown below how Polya's concepts can be applied to the problem which students have to solve when taking online classes.

In Figure 1, a fragment of the main page of the online course is shown where our study was conducted. On the left side of the screen, there is menu with links leading to the major content areas of the VCR. Orientation should consist in examining these content areas and getting the data for solving the problem. The *Course Policies* link leads to the administrative aspect of the VCR. The links *Syllabus*, *Course Information,* and *Coursework by Week* are multifunctional and provide information about all aspects of the educational process. The *Instructor Information, All Discussions, Send E-mail,* and *All Announcements* links represent the communicational aspect of the VCR. The *Blackboard Help* leads to description of technological resources, and the *Library Homepage* helps to perform academic tasks.

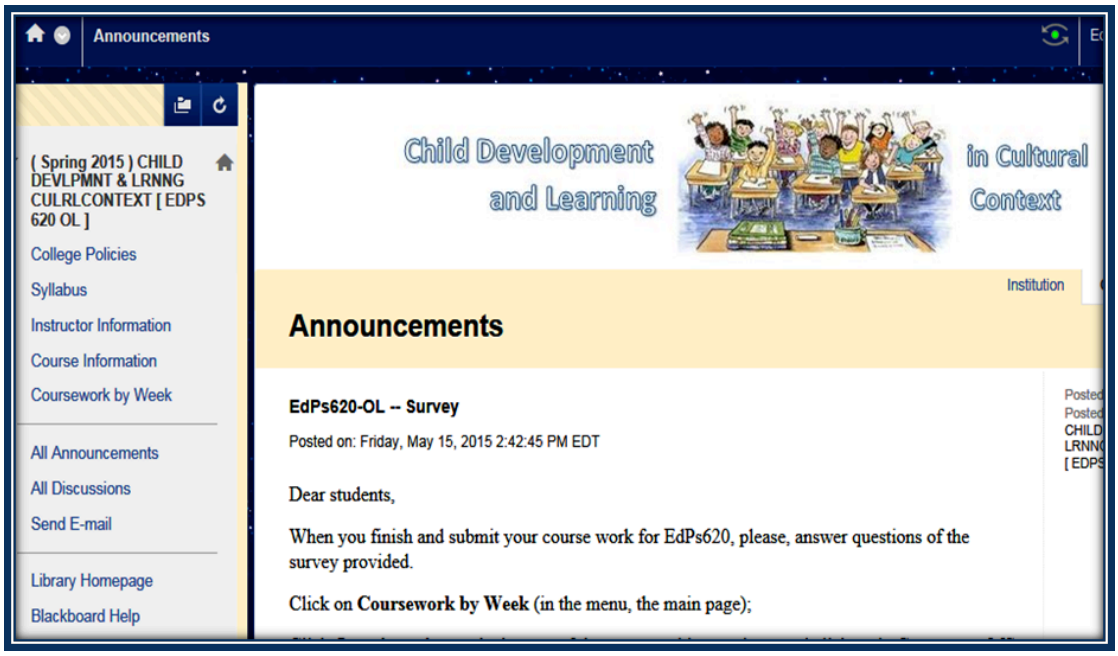

Figure 1. The main page of the online course where the study was conducted

By clicking the links and exploring the course content areas any student can receive information needed for successful learning and completion of the online course. This information constitutes the data of the problem which allow refining the problem's statement. After that a student is ready to start the actual solution of the problem. As Polya would say, a solver can advance to the next stage of solving the problem. In our case, it will be devising a study plan.

Orientation in the VCR and e-Learning readiness

Orientation means "the act or process of adjustment to a new environment, situation, custom, or set of ideas…" (The Free Dictionary). Virtual classroom, according to the definitions, is "a mode of computer-based education" (Dictionary), "an online learning environment", "a learning environment created in the virtual space" (The

Virtual Classroom Defined). Adjustment to such environment is successful when and as far as orientation is successful. Orientation in the VCR, like e-Learning readiness, may predict successful learning. These two concepts are closely related.

The first instrument to measure readiness for online learning was created in Australia in 1990s (Warner et al., 1998). After that it was modified on many occasions (McVay, 2000, 2001; Hung et al, 2010). In its initial version, such characteristics of students' readiness as computer-use skills and Internet-navigation skills were absent; probably, they appeared first in the recent works of Taiwanese specialists. The Online Learning Readiness Scale with five dimensions created by M.-L. Hung and his colleagues was eventually validated and adopted by educators from many Asian, African and Middle East countries (Kaur & Abas, 2004; Watkins et al, 2011; Yurdugul & Alsancak, 2013). Remarkably, the researchers are increasingly interested in the population of the teachers mastering new learning environments (So & Swatman, 2006; Bukaliya & Mubika, 2011).

However, an ability to quickly and flexibly orient oneself in an online course is not included into the mentioned scale. No one out of statements related to the computer/Internet self-efficacy dimension, reflects this characteristic. We suggest that the cause rather is methodological than logical. To construct the scale of e-Learning readiness, authors conducted surveys. However, measuring students' perceptions and opinions is not the best method for the study of their orientation in a virtual environment, a process which does not yield too easily to awareness and verbalization. For this purpose, there exists another methodology based on the analysis of people's learning activity. Being more direct, the latter method is at least as, or even more objective and efficient than the prior one. The virtual classroom has been already fruitfully used to assess cognitive processes and diagnose learning disabilities (Rizzo et al., 2002; 2004). We also apply this methodology for studying the students' orientation in the VCR and predicting their success in online courses.

Research

Goals, hypotheses, and methodology

The purpose of this work is to develop a method for quantifying students' orientation in VCR and study various orientation strategies which they demonstrate when learning online. Our hypotheses consisted in the following: a) there may be a connection between students' orientation strategies and their academic achievement; b) previous online experience may influence a student's orientation in the VCR. The research methodology included: a) an analysis of the students' preparation for their study in the course, b) an evaluation of correlations between students' orientation in the VCR and their final grades as well as the number of taken online courses.

Participants

The participants were students of Touro Graduate School of Education (GSE) enrolled in the Education and Special Education degree and certificate program. All of them were current preschool or school teachers. The students were assigned by the college registrar's office at random to groups in which they remained throughout the semester.

76 graduate students participated in the study. The experimental group included 25 students; the control group 1 had 26 students, and a control group 2 had 25 students. All the students took the same online psychology course *EdPs620-Child Development and Learning in Cultural Context* in the spring semester of 2015 with the same instructor (the author of the study). The author was the only course designer, developer, and instructor for the experimental group. Students of both control groups studied in the sections of the course designed differently. Four members of the experimental group were beginners who had to go through a preliminary training to become familiar with the Blackboard platform and develop some skills necessary for learning online. There were no beginners in the control groups. All participants of the study had some skills of using basic functions of a word processor such as Word.

Procedures and outcomes

First, we analyzed the students' activities in the VCR during a week before the semester had begun. Based on these activities we classified the students' orientation strategies.

Second, we evaluated correlations between some indicators of students' orientation and their final course grades as well as the number of courses taken online. It helped to advance certain assumptions about the nature of human orientation in the VCR.
Finally, we analyzed the relationship between students' orientation strategies and their final course grades. It allowed to find out whether there was a connection between certain strategies and high or low academic achievement. This might help to predict the students' success or risk of failure in online classes.

Methods of collecting statistical data

As we have already mentioned, The Blackboard, a software platform for our VCR, was used as an instrument of collecting data about students. It recorded and archived all the students' activities in the course during the semester and a week before it. The Black Board registered the students' time of arrival and departure as well as activities in the VCR content areas. "Course Management – Evaluation" was that Black Board tool which provided the instructor with access to course statistics. This tool generated various reports and allowed viewing information about course usage and the students' specific activities in the course site. *Course Activity Overview* and *All User Activity inside Content Areas* reports were the most helpful for the purposes of our research.

The *Course Activity Overview* report displayed overall activity within the course sorted by student and date. The data included the total and average time spent per user and the total amount of visits made by every user to the VCR. The *User Activity inside Content Areas* report displayed a summary of all activities inside such major content areas as *Black Board Help, College Policies, Course Information*, *Coursework by Week, and Syllabus*.

Data Representation

Students' orientation in the VCR before the semester had begun

Unlike students of the traditional classroom, online students' may start their attendance and activities earlier than the semester begins officially. The participants of our study had an opportunity to log into the course site and freely explore there

during a week before the semester had begun. This preparation appeared to be the most informative for identifying their strategies. When examining the students' activities and analyzing statistical data, we focused on the three indicators described below.

Time spent in the VCR

Time spent in the VCR within the evaluated period is called the students' orientation activity and denoted by ORN_A. Its values are presented in Figure 2. The vertical axis of the graph shows the students' encoded names; the horizontal axis shows time (in hours.) Time spent by the students in the VCR is presented by the horizontal bars located on the right side of the codes. Numbers on the right of the bars mean amount of time.

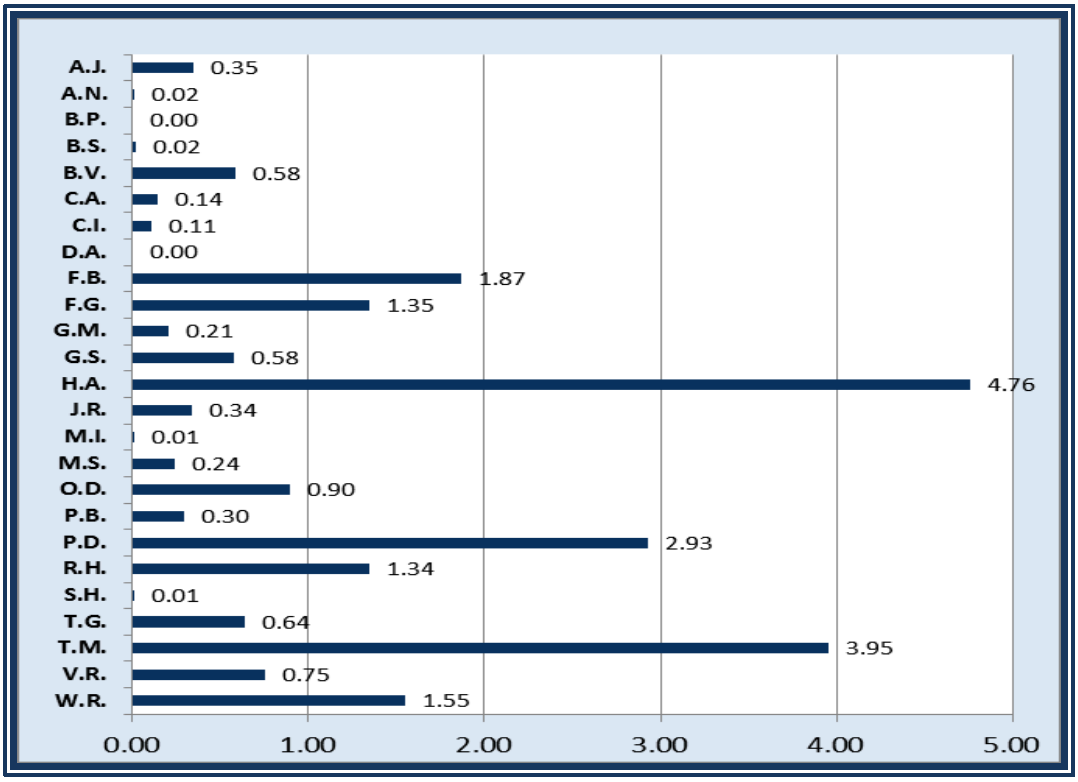

Figure 2. Statistics of time spent by students in the VCR before the semester started

Visits to the VCR

Like time spent in the VCR, the total number of visits into the VCR, which occurred within the evaluated period, is a parameter of the students' orientation activity that we denote by ORN_{AI}. These data are placed in Table 1 in the columns ***a*** through ***e.*** For each student their number constitutes the sum of the values in these columns.

Explored content areas of the VCR

Distribution of visits between content areas in the evaluated period indicates students' orientation in the VCR content and is denoted by ORN_C. These data are presented in the columns ***a*** through ***e*** of Table 1.

Mathematical Analysis of Data

Principles of encoding data

Times spent in the VCR before the semester had begun represented students' ORN_A. Numbers of visits to the VCR were used for the same purpose. Numbers of explored

areas of the VCR content represented students' orientation in content. Final course grades were used as an indicator of students' academic achievement *AA*. The numbers of previously taken online courses represented the students' online experience *EXP*. We encoded students' experience with the values of 0, 1, and 2. If a student had taken no courses, his experience was set to 0. If the number of courses taken by a student was between one and four, her/his experience was coded by 1. If a student took more than four courses, his/her experience was set to 2.

Table1. Statistics of students' visits to the content areas of the VCR

	Content areas of the VCR					Σ (a, b, c, e)	Ratio (d/f)
	BB Help *a*	*C. Policy* *b*	*Course Info* *c*	*C.W. by W.* *d*	*Syllabus* *e*	*f*	*g*
AJ	0	0	3	10	0	3	3.33
AN	0	0	0	1	0	0	0
BP	0	0	0	0	1	1	0
BS	0	0	0	0	0	0	0
BV	0	0	10	51	3	13	3.92
CA	0	0	1	14	2	3	4.67
CI	0	0	0	13	0	0	0
DA	0	0	0	0	0	0	0
FB	0	3	9	31	2	14	2.21
FG	0	0	2	46	1	3	15.33
GM	0	0	2	17	0	2	8.5
GS	0	0	3	3	2	5	0.6
HA	0	0	15	107	3	18	5.94
JR	0	0	0	4	1	1	4
MI	0	0	0	1	0	0	0
MS	0	0	7	6	2	9	0.67
OD	0	0	1	36	1	2	18
PB	0	0	6	20	3	9	2.22
PD	0	1	5	12	2	8	1.5
RH	0	0	5	19	2	7	2.71
SH	0	0	0	3	0	0	0
TG	0	1	6	9	3	10	0.9
TM	0	1	27	91	3	31	2.94
VR	0	0	0	5	1	1	5
WR	0	0	8	28	3	11	2.55
	Average ratio						**4.72**

Note: The leftmost column presents students' encoded names; BB Help (a) is short abbreviation for *Blackboard Help*; C. Policy (b) - the same for *College Policies*; Course Info (c) – the same for *Course Information*; C.W. by W. (d) – the same for *Coursework by Week;* Σ (f) is the sum of the columns a, b, c, e.

After coding the data, every one of the 25 participants, was specified by a tuple of five numbers shown in Table 2. Based on these data the correlation analysis was conducted.

Table 2. The sample of tuples representing some students' data (fragment)

	ORN_A	ORN_{A1}	ORN_C	AA	EXP
AJ	0.35	13	2	85	1
AN	0.02	1	1	81	1
BP	0.00	1	1	80	1
BS	0.02	0	0	90	1
BV	0.58	64	3	87	0
…	…	…	…	…	…

From the mathematical point of view, a variable corresponds to every mentioned above characteristic. To find how strong the relationships between the variables were, Pearson's correlation coefficients were calculated with the use of the following formula:

$$K = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}},$$

where *n* is the number of students in the group; $x=(x_1 \ldots x_n)$ and $y=(y_1 \ldots y_n)$ are distributions of the chosen variables ("How to Compute Pearson's Correlation Coefficient", 2015).

Correlational analysis showed a high positive dependency between both indicators of orientation: $K\ (ORN_A,\ ORN_{A1}) = 0.83$. So, for convenience, in farther calculations we will use only ORN_A. Also, indicators of orientation positively correlate with each other: $K\ (ORN_A,\ ORN_C) = 0.5$.

A positive correlation was found between students' orientation activity and their academic achievement: $K\ (ORN_A,\ AA) = 0.38$. No significant correlation was found between orientation activity and online experience: $K\ (ORN_A,\ EXP) = -0.1$.

Moderate positive correlation was found between students' orientation in the VCR content and their academic achievement: $K\ (ORN_C,\ AA) = 0.57$. A negative correlation was found between orientation in the content and online experience: $K\ (ORN_C,\ EXP) = -0.47$.

The analysis of preferences which the students gave to the content areas of the VCR showed that *Coursework by Week* was visited much more often than all the other areas. Average ratio for that subgroup of students which visited the VCR before the semester had begun was 4.72.

Results and Discussion

Orientation in the VCR

Students explored the content areas of the VCR with different degrees of interest. Nobody explored technological resources provided by *Blackboard Help.* Only six out of 25 participants familiarized themselves with *College Policies* for online education. Even such an important document as *Syllabus* was not examined by some students (see Table 1, rubrics *a, b,* and e.)

Meanwhile, many students were mainly interested in the *Coursework by Week* – it was visited much more often than all the other areas of the VCR put together. It seems

that they wanted to start the first homework assignment which was due soon. However, their eagerness to learn the subject did not compensate for lack of curiosity in mastering the instrument of learning. In fact, they substituted the problem. As Polya would have said, instead of clarifying the problem, they immediately started trying to solve it.

Orientation and academic achievement

The hypothesis about connection between orientation and academic achievement is confirmed: K (ORN_A, AA) = 0.38. A higher orientation activity occurred together with a higher final grade. The amount of time spent in the VCR before the semester had begun ensured more successful performance during the semester. Dependence between orientation in content and final grades is even more significant: K (ORN_C, AA) = 0.57. These results correspond to Polya's theory: the more time is spent for understanding the problem: its data, statement, and the unknowns, – the higher the probability that the problem will be solved successfully.

Orientation and online experience

No correlation was found between orientation activity and experience: K(ORN_A, EXP) = – 0.1; and negative correlation was discovered between orientation in the content and experience K (ORN_C, EXP) = – 0.47. Thus, an extensive review of the VCR was undertaken more often by novices than experienced students. There are several explanations of this result. By online experience we mean the number of taken courses. However, the courses differ in their quality. Perhaps, some "experienced" students attended courses in which they were not taught to explore the VCR. Also, need for orientation may depend more on a student's personality than on her/his professional experience. Self-organized and self-disciplined individuals need less time than others to prepare themselves for a new online course.

Another interpretation is connected with a well-known discussion about "digital natives and digital immigrants"[3] (Prensky, 2001; Margaryan, 2011). Some authors call these terms metaphor and question their rightfulness. Anyway, we cannot deny young people's ability to act (work, learn, and entertain) more freely and easily in the virtual spaces than such of the older generations. This feature is more visible in individuals competent in natural sciences and less – in humanitarians. However, people with such inclinations may appear in all areas. No doubt, there were "digital natives" among our students, and their special learning style in the VCR is reflected in the results obtained.

Orientation strategies

The data provided by the Blackboard allowed to detect two components of the students' orientation: orientation activity and orientation in the content of the VCR. The first one is similar to cognitive eagerness and curiosity; the second one relates to erudition and ability to organize and structure accumulated knowledge. Presence of both components determines successful orientation and learning, while absence of one or both components results in adoption of special orientation strategies.

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[3] The terms *digital natives* and *digital immigrants* were originated by Mark Prensky. They may apply to different generations: those who were born after and before the spread of digital technology. Some were exposed and some others were not in their young years to computers, videogames, video cams, tablets, I-phones, Internet, and other toys and tools of the digital age.

The students' data are represented by the two-dimensional diagram in the Figure 3. The two components of orientation are displayed as perpendicular axes: "Orientation activity" vs. "No orientation activity" represents the vertical axis, and "Orientation in content" vs. "No orientation in content" represents the horizontal axis. The students are illustrated as colored disks; the numbers inside them are their final grades. Colors of the disks mean degrees of success: effective students are shown in blue, students that experienced difficulties within the semester are shown in yellow, and failed students – in orange.

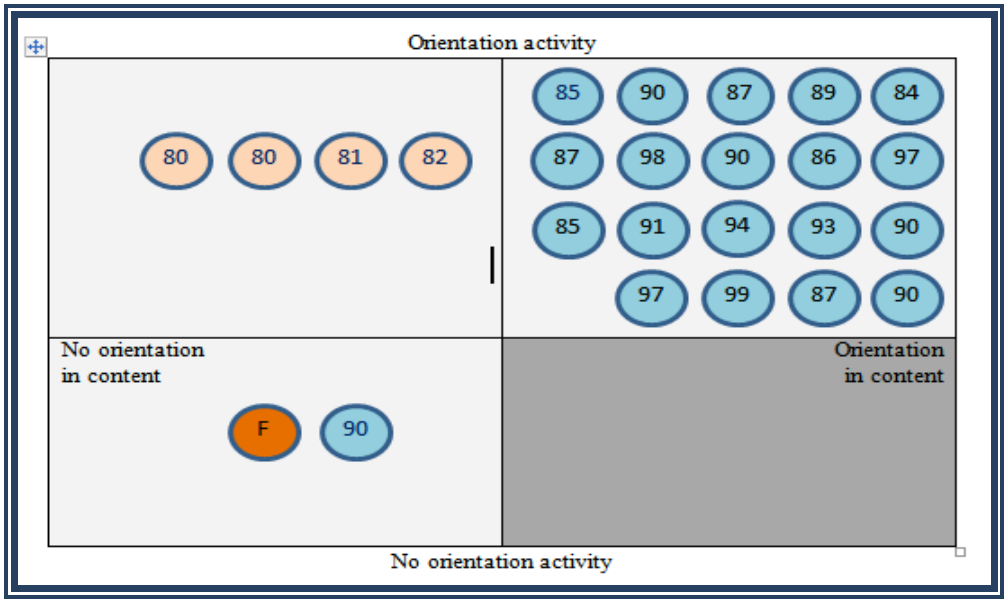

Figure 3. Representation of orientation strategies in students of the experimental group

In the *right top quarter* of the Figure 3**,** 19 students are located whose orientation strategy included both components – orientation activity and orientation in the content. All of them received good grades, were productive learners and successfully completed the course[4]. Therefore, presence of both components of orientation makes favorable prognosis for studying in online course.

Students located in the *right top quarter* have ***prudent strategy.*** They start with a preliminary acquaintance with the learning environment, in which they will study. They come to the VCR in advance and explore the course organization, its policy, technological tools, instructions for performing the coursework and submitting it to the Blackboard etc. Also, they prepare their first homework assignment early. They learn how to work with the VCR ahead of time, and it makes them feel comfortable. Metaphorically speaking, these learners undertake "acceleration before jumping". They are caring and diligent. They are sensitive to stress and try to avoid mistakes and misunderstanding which may prevent them from successful learning. This is the most common type of online students.

[4] In American education, the 100-point system for evaluating students' knowledge with corresponding letters is commonly used. At Touro GSE, grades from 80 to 100 are considered passing. They include A+(98-100), A (94-97), A-(90-93), B+(87-89), B (83-86), and B-(80-82); grades below 80 are considered failing (F).

In the *right bottom quarter,* there are no students. This case is impossible: if one does not have orientation activity, s/he certainly will have no orientation in content either.

In the *left top quarter* of the Figure 3**,** four students are located who displayed orientation activity but showed no orientation in the VCR content. Although these students completed the course, their final grades were on the boundary of failure. Thus, ignoring the VCR content may serve as a prediction of failure.

We say that these students have ***close-minded strategy.*** Although they came to the VCR before the semester had begun, they did not explore it. They barely understood importance of such exploration. They had a limited outlook and goal. They only wanted to see their first homework assignment. They had false ideas about their competence as online students. "Should I examine this online course, – they might have reasoned, – if I have already taken some others?" Very soon they exhausted their possibilities and realized that they could not master the new knowledge and skills alone; so they asked the teacher for help. Thus, they succeed only due to an additional instructional support. Such students are not common, but they constitute that category of online learners to which the additional instructional attention and support has to be given.

In the *left bottom quarter* of the Figure 3*,* two students are located; both did not visit the VCR before the semester had begun. Eventually, one of them successfully completed the course, and the other failed. Thus, total absence of preliminary orientation in the VCR is an ambiguous case which may have different consequences: it may lead to a failure but not always. The progress of such students should be monitored for more substantiated expectations and conclusions.

Let's discuss in detail the two students in this category. The first one had, as we say, ***self-assured strategy.*** It is one of those individuals who do not need a preliminary acquaintance with the VCR. They prefer «immediate immersion». They can explore the VCR along with performing the coursework. When working in the course, they rarely ask their teacher or classmates for help. They are not anxious; they are stable and very independent.

The other student, as we say, applied ***neglectful strategy.*** Usually, such students appear in the VCR by the first due date for submitting the coursework, if not later. They provide various excuses and ask about "some extension". However, extension does not save them. All of them quit the course sooner or later. Such students fail because they "try playing the game without knowing its rules". They ignore the fact that there are rules to follow. They are known as "problem students", whose enrollment in on-line distance classes, probably, was a mistake. They first need to be helped in developing skills for learning in general.

Reliability of the Result

Course Activity Overview and *All User Activity inside Content Areas* reports of 51 students from the control population were analyzed. Their ORN_A and *ORNc* shown within a week before the semester had begun were discovered.

Correlation coefficients between the students' ORN_A and their *AA* for both control groups were calculated. A dependency between the students' orientation activity and final grades in both control groups was found. These results are displayed in Table 3. Closeness of these results to the result of the experimental group confirms their reliability.

Table 3. The Correlation Coefficients between ORN_A and *AA* Listed by Group Type.

The Correlation Coefficient K (ORN_A, AA)		
The experimental group	The control group 1	The control group 2
0.38	0.40	0.32

In the control groups, the same four orientation strategies were found: prudent, close-minded, self-assured, and neglectful. Their quantity in the control groups was different; their quality was similar. Like in the experimental group, the students with prudent strategy constituted a majority in the control population.

Some students from the control groups 1 and 2 did not orient themselves in the VCR before the semester had begun. Again, like in the experimental group, opposite orientation strategies were found among such students. Those of them, who had the neglectful strategy, failed; others succeeded.

Similarity of orientation strategies demonstrated by students of the experimental and control groups also confirms the reliability of the results received in the study.

Conclusions

An analysis of students' activity in the VCR before the semester had begun is an appropriate approach which allows the instructor to better understand the students' needs, problems, and orientation strategies as well as to predict their success in the online classes. Blackboard environment provides the data for identifying two major components of orientation in the VCR: orientation activity and orientation in the content. Their presence makes prognosis of online learning favorable, while their absence predicts a risk of failure.

Analysis of two major components of the students' orientation in the VCR allowed to identify four different students' strategies: prudent, close-minded, self-assured, and neglectful. Orientation strategies of the same types were found in the control population.

Students who used a chance to explore the VCR before the semester had begun productively studied within the semester. However, some others did not use extra time given for exploring the VCR, and it did not undermine their success in learning.

Probably, they belonged to the category of technologically advanced individuals, those who in the literature are often called “digital natives”.

Farther enhancement in the online courses’ design should account for the potential difficulties of many students’ adjustment to the VCR. New forms of instructional support are needed to help online learners specializing in social sciences, especially beginners, develop skills for acquiring adequate knowledge of the VCR. A better understanding of the instrument of learning allows for a more productive study of the course subject.

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