

Interactions between College Students and Professors in a Virtual Learning Environment

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Abstract : *The Autonomous University of Yucatán has made use of learning management systems to support their face-to-face educational programs since 2003, and at this moment, has established a tool under the name of UADY Virtual, structured on the freely distributed software MOODLE. This study has the goal of identifying how interactions between students and professors happen in this system; for this purpose, an online survey was directed towards grade students who were signed up on it. Statistical methods were employed to analyze this information and Gibb's model was used to make a concept-based codification. It is possible to infer that UADY Virtual propitiates interactions between professors and students, who made use of it to interchange significance-charged information, however, much work needs to be done in order to motivate students to make these interactions using this medium and not external tools.*

Keywords: *Distance education, Virtual classroom, Cooperative learning, Classroom communication*

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I. Introduction

Keegan [1] suggests the interpretation of the term Distance Education (DE) as a form of education characterized by the separation of teacher and student during the teaching-learning process: "DE uses technological mediums as facilitators for teacher-student communication, with the goal of transforming learning into an individual process, and not a group one, allowing the adaptation of its contents to the needs of each participant".

One form of DE is that of Blended Learning (BL), which Borgobello, Sartori and Rosell [2] describe as: "learning activities that involve a systematic combination of face-to-face and technologically mediated interactions among students, teachers and learning resources". BL arises in the midst of a recent change in the way in which users relate to contents available on the Internet: from being static materials placed by a designer and meant to be used -but not modified-, they have been transformed into systems of meta-textual exchange, which allow users not only to interact with the person responsible for the site, but even with other users. This paradigm shift has led to identify sites that meet these requirements as belonging to the 2.0 Web.

For Haro [3]: "the Web went from being something static and more or less orderly, created by Webmasters, who reproduced the interests of their companies, to become something where information flows at a tremendous speed, with incessant conversations between people, with information changing in real time at every moment and where chaos reigns more than order". On the other hand, Castaño, Maíz Palacio and Villarreal [4] point out that: "the 2.0 Web is a concept that was born as a contrast to traditional internet uses. It is related to the new way of using the internet. In a more personal way, more participatory, more collaborative".

Regarding this, Hernández, Ramírez-Martinelli and Cassany [5] comment that 2.0 Web users present two key characteristics: "the improvement of it with respect to the one whose operation was based on islands of information; and that is also eminently social, that is to say that shares, collaborates and has a presence on the web". As a result, there has been a radical change in the way in which information is transmitted, going from following a vertical model to a horizontal one in which it is freely shared in multiple directions. Alarcón and Lorenzo [6], likewise, point out that the term 2.0 Web or social web is used "to refer to a new trend in design and use of websites, in which the user is the center of information and where he also acts as an active generator of content".

For Freire [7], this transition to online systems sometimes causes conflict within institutions, because: "the transition from closed to open systems and distributed centralized architectures facilitates the strengthening

of learning forms in which there is a focus on the student's initiative and their creative and innovative capacities". In this regard, Pineda, Meneses and Telles [8] comment that: "in traditional communication, the actors involved in the exchange of information assumed passive roles; in the framework of network communications, there are no passive subjects, the dynamics that are generated correspond to relationships of reticularity".

Maraver, Hernando and Aguaded [9] add that this implies changes in the role played by the teacher, since: "they orientate him towards more important dimensions than being a mere transmitter of information, such as playing the part of a communicator and designer of instructional situations, tutor and counselor in the construction of knowledge through new media".

Another possibility provided by these technologies is bringing teacher-student communication beyond the classroom, about which Abarca [10] mentions that: "a virtual work space makes it possible for any subject, in our case, teachers and students, to be able to be in contact and in permanent communication with students or teachers regardless of where they are". Cerrillo [11] states that: "this expansion is being facilitated by the massive adoption of portable computers and smart mobile phones, as well as by the growing reality of network collaboration among administrations, companies and citizens".

Similarly, another feature which promises great potential for change in the way the educational process is developed, is the opportunity they provide to modify communication channels, by allowing information to flow freely in all directions. and among all the participants. As Ibarra and Llata [12] point out "communication within these screens is modifying the ways of learning of children and young people, since Internet places all interactions at the same level, unlike traditional communication, which imposes a hierarchical relationship".

Integrating these technologies into their curriculum is becoming important for an ever-growing amount of academic institutions, in view of their possibilities as facilitators of improvement in the educational process. However, sometimes these technologies are introduced without a solid theoretical foundation, reducing then to be only retransmissions of contents thought for traditional methods. As Boude [13] points out, teachers need to be aware of the challenges involved with this change, since "integrating information and communication technologies into their teaching and learning processes arises as a result of a reflection process which must take into account the educational context, the competences to be developed and the curricular design".

However, as Cabra-Torres and Marciales-Vivas [14] remark, although there have been a variety of studies on the subject, the application of 2.0 Web tools in the field of education is still a recent issue, so the amount of literature available is limited, particularly in the case of that concerned to studies conducted in Spanish-speaking countries. It is therefore highly relevant to carry out studies that allow analyzing the impact that the introduction of these technologies in the educational field, inside and outside the classroom, may have on the students' academic performance and the way in which they interact with the students. contents of their courses, their teachers and their classmates.

II. Learning Management Systems and Virtual Learning Environments

Learning Management Systems (LMS) are systems focused mainly on the educational area, that allow to keep a control of the contents and users that interact within them. Their main functions are controlling the use of resources and training activities, managing access to participants and course designers, controlling and monitoring the learning process, facilitating the performance of evaluations, generating reports and managing communication services such as forums, messages, etc. As explained by Sánchez [15], these systems are divided into two types according to their distribution being based on free software (like MOODLE, Sakai, Chamilo and Claroline), or on proprietary software (examples of these are Blackboard, Sumtotal, Canvas and Schoology).

A recent tool related to distance education are Virtual Learning Environments (VLE), which Kurbel [16] defines as: "learning and instruction environments in which teacher and student are separated by time or space, and where the teacher provides the content of the course through course management applications". VLE's allow access through browsers, use 2.0 Web services, have graphical interfaces and present modules for management and academic administration, adapt to user characteristics, enable communication and interaction between students and teachers, present different types of activities that can be implemented in the course and incorporate resources for the monitoring and evaluation of students, as defined by Belloch [17]. Other characteristic of these environments, as commented on by Galvez and Tirado [18], is that co-presence is not necessary, there is a clear presence of technology, and they enable interaction among a large number of people, by means of sets of written texts. previously established images and sounds, and following a flexible structure.

III. Interactions in Virtual Learning Environments

For the purpose of this study, interactions in VLE's will be understood as reciprocal exchanges of information, whose purpose is to develop knowledge within a learning environment, and whose main characteristics are communication, collaboration and active learning, as defined by Thurmond and Wambach [19].

These interactions are facilitated by the capacity of these systems to provide them with both spatial and temporal structures for communication, as Gairín and Muñoz [20] point out: “by adding elements such as topics, moderator intervention, message interaction, argumentations, communication exchange, sequences of exchange, we observe that the communicational fabric is transformed into a multiple discussion, which generates different knowledge in the dialogical relationship of the participants”.

Gunawardena, Lowe and Anderson [21] developed a model for the measurement of the interactions in the work groups within VLE’s, classifying them according to their purposes and role in the decision making, in: “share and compare information, discovery and exploration of dissonance and inconsistency, negotiation and exploration of dissonance and inconsistency, verification of and modification of the synthesis and proposed construction, and agreements and application of the new construction”. In contrast, Tió, Estrada, Gonzales and Rodríguez [22] divide the interactions within these systems in the following way, according to their purposes and indicators, in “exploration, integration, reasoning, resolution, affective, group cohesion and promotion. of the interaction”. Finally, Yus [23] proposes a classification of seven types for the interactions that occur between the participants in a virtual course, being this as follows: “social or outside the task, organization to perform the task, progress in the writing of the answer, requests for help. confirmation of acceptance of the response prepared in group, response to requests for help and socialization of the issue”

IV. Context

UADY Virtual is a VLE with infrastructure in the freely distributed LMS MOODLE (Modular Object-Oriented Dynamic Learning Environment), and was created in 2011 based on the stipulations of the Institutional Development Plan (PDI, “Plan de Desarrollo Integral”) and the Educational Model for Integral Formation (MEFI, “Modelo Educativo para la Formación Integral”). Its purpose is to integrate both the Online Education System (SEL, “Sistema Educativo en Línea), a mixed method virtual education tool which today houses an online pre-graduate education program, with contents that support its college programs.

The 2014-2022 PDI of the Autonomous University of Yucatán (UADY, “Universidad Autónoma de Yucatán”) seeks to develop a greater educational VLE offer and strengthening face-to-face programs aligned to the MEFI with digital educational resources and VLE tools; along with training academic and administrative staff in the use of these tools. Along with this, UADY established its educational and academic model in 2002, in which the use of virtual learning environments was an important element; that is why, in 2003, the SEL was implemented as support for face-to-face teaching. In 2012, the educational and academic model was updated according to international and national trends in education, which gave rise to the training proposal of the MEFI.

In 2013, this educational institution established a Learning Management System called UADY Virtual, which is structured under the MOODLE free distribution software, and is accessed through the web address: <http://es.uadyvirtual.uady.mx/>. As noted in the PDI [24], the mission of this technological tool is to: “be a learning and training space, supported by communication and information technologies, to promote academic innovation in the institution, achieve greater equity in access to higher and higher secondary education, thereby preparing students for a global environment, inter and multicultural according to what is established in the MEFI. Also, to provide greater opportunities for updating and training of active professionals, those who are in the process of reintegration into the world of work and for adult education”.

Support for the implementation of the MEFI and therefore of UADY Virtual is in hands of the Department of Innovation and Educational Research (DIIE, “Departamento de Innovación e Investigación Educativa”) which is part of the General Directorate of Academic Development (DGDA, “Dirección General de Desarrollo Académico”). Currently, the percentage of implementation of the MEFI in the UADY is of 76% (34 of 45 educational programs) at the undergraduate level and of 36% (20 of 56 educational programs) at the graduate level.

V. Population and Sample

A selected sample was used, taken from the total of students from three of the university campuses who were enrolled in the UADY Virtual system in 2017, a number that can be seen in Table number one:

Table 1: Sample

Campus	Faculty	Students enrolled in UADY Virtual	Sample
<i>Social, Economic, Administrative and Humanities Sciences</i>	<i>Anthropological Sciences</i>	147	15
	<i>Accounting and Administration</i>	1898	120
	<i>Law</i>	838	60
	<i>Economy</i>	184	20

<i>Exact Sciences</i>	<i>Education</i>	50	10
	<i>Engineering</i>	723	50
	<i>Chemical Engineering</i>	844	60
<i>Health Sciences</i>	<i>Mathematics</i>	572	40
	<i>Infirmery</i>	407	30
	<i>Medicine</i>	226	20
	<i>Odontology</i>	320	25
	<i>Chemistry</i>	376	30
Total		6585	480

VI. Instrument

An online survey consisting of 26 items was used, divided into four sections: demographic data, experience with UADY Virtual, interactions in UADY Virtual, and perception of interactions in UADY Virtual. The questionnaire was designed using the "Survey" tool of the MOODLE Learning Management System, and the participants accessed the questionnaire from the main screen of UADY Virtual. The instrument can be seen on Table number two:

Table 2: Instrument

Section	Questions	Type	Contents
Demographic Data	5	Dichotomic, numeric, multiple answer	Gender, age, faculty, degree and semester
Experience with UADY Virtual	4	Dichotomic, numeric, multiple answer	Type of formation, number of classes
Interactions in UADY Virtual	15	Scale, dichotomic, short answer	Intentions and frequency of interactions in UADY Virtual with students and professors using forums and messages
Perception of interactions in UADY Virtual	2	Likert scale	Perceptions of the impact of interactions with students and professors in UADY Virtual on personal educational performance

In order to verify the reliability and validity of the instrument, it was subjected to a pilot test for its validation, with the participation of 27 students of the third semester of the Education degree program of the UADY. The students were invited to participate at the end of one of their class sessions, and they answered the instrument in person using the computers available in the computer room of that faculty. The answers were collected for analysis in a database with the statistical software SPSS (version 22).

VII. Results

VII.I. Demographics

Of the total of 307 participating students, 181 were female (58.96%), while the remaining 126 (41.04%) were male. Regarding the average age of the participants, this was 20 years, with the highest number of students (84, 27.36%) having at that time 19 years, followed by those with 20 years (73, 23.78%) and in third place for those who had turned 21 (46, 14.98%).

On the subject of their campus of origin, most of the students came from the Campus of Social Sciences, Economic and Humanities (172, 56.03%), followed by those belonging to the Campus of Health Sciences (81, 26.38%) and finally of those assigned to the Campus of Exact Sciences and Engineering (54, 17.59%). Participants in the study on average were in the third semester, with a majority of these students in the second semester (140, 45.60%), followed by those who were in the sixth semester (63, 20.52%) and the ones who were at that time coursing the fourth semester (18.24%). On the matter of the number of classes they had attended with the support of UADY Virtual before answering the instrument, the students indicated an average of 14, with the most frequently mentioned amounts being 2 (7.5%), 8 (7.5%) and 40 (7.2%).

When questioned whether they had received any type of training for the use of UADY Virtual, the students indicated mostly that they did (214, 69.71%), as opposed to 93 (30.29%) who stated the opposite. Students affirmed that this majorly (145, 47.2%) was given before starting their regular classes, followed during the class sessions themselves (93, 30.3%) and to a lesser extent outside of class (44, 14.3%). Students also commented that this training was mainly in the form of advice from their teachers (120, 39.1%), followed by a specialized course (94, 30.6%), receive advice from their classmates (52, 16.9%) and finally request external

advice from family members, colleagues from other institutions, the internet, etc. (12, 3.9%). A recap of this information is presented on Table number three.

Table 3. Demographics and Experience with UADY Virtual

Variable	Category	Frequency	Percentage
Age	18-21 years old	247	80%
	22-25 years old	57	18%
	More than 25 years old	3	2%
Campus	Social Sciences	172	56%
	Exact Sciences	81	26%
	Health Sciences	54	18%
Semester	First and second	18142	46%
	Third and fourth	67	22%
	Fifth and Sixth	70	22%
	Seventh or higher	28	10%
Number of classes taken on UADY Virtual	10 or less	172	56%
	11 to 20	63	20%
	21 to 30	25	8%
	More than 30	47	16%
Type of formation for the use of UADY Virtual (Multiple choice)	Specialized course	94	30%
	Help from professor	120	40%
	Help from peers	52	16%
	External help	12	16%

VII.II. Interactions and intentions: students towards professors

Focusing on the interactions that are directed from the student to the teacher, the students mentioned that they occur mainly through the Forum (212, 69%), and to a lesser extent through the Message tool (182, 59%). Specifying the frequency with which these interactions occur in the Forum, the students stated that they usually appear less than once a week (almost never, 112, 36.48%), followed by at least once a week (sometimes, 65, 21.7%), two to four times a week (frequently, 32, 10.42%) and finally more than four times a week (always, 3, 0.98%), while a third part signaled not to use it (never, 95, 30.94%).

In the case of the Message tool, students indicated that to use it to interact with their teacher, this is usually done less than once a week (almost never, 109, 35.5%), followed at least once a week (in occasions, 48, 15.64%), two to four times a week (frequently, 21, 6.84%) and to a lesser extent more than four times a week (always, 3, 1.30%), however a majority do not use this tool (never, 125, 40.72%).

Students use forums to interact with their teacher -in descending order according to the number of affirmative answers- to organize the delivery of work (175, 57%), provide knowledge (147, 47%), request the review of some activity (132, 42%), confirm receipt of tasks (128, 41%), request help for carrying out some activity (103, 33%), requesting additional information (100, 32%), reporting an error (94, 30%), discussing the way in which the subject is being carried out (87, 28%) , clarify some instruction (82, 26%) and finally to discuss issues not related to that particular class (61, 19%), as can be seen on Fig. number one.

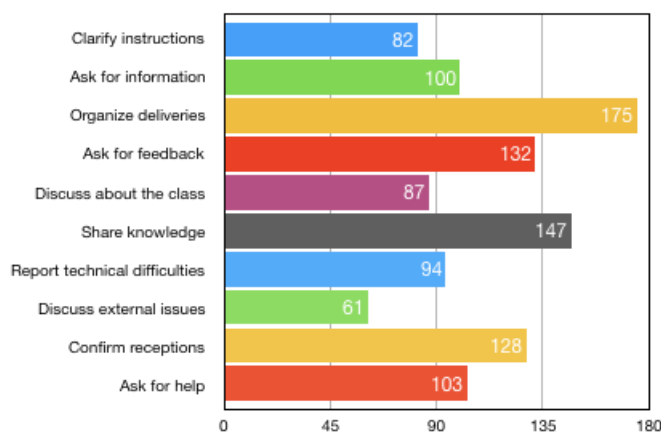


Figure 1. Interactions and intentions: students towards professors in a Forum

Regarding the purposes of the interactions directed to their teacher by means of the Message tool, the students mentioned that this is mainly used to organize the delivery of homework (125, 40%), confirm the reception of tasks (102, 33 %), report errors (99, 32%), request the review of some activity (96, 31%), clarify some instruction (91, 29%), request help (90, 29%), provide knowledge (84, 27 %), discuss the way in which the subject is being carried out (70, 22%) and finally to discuss issues outside of that subject (58, 18%), as shown in Fig. number two.

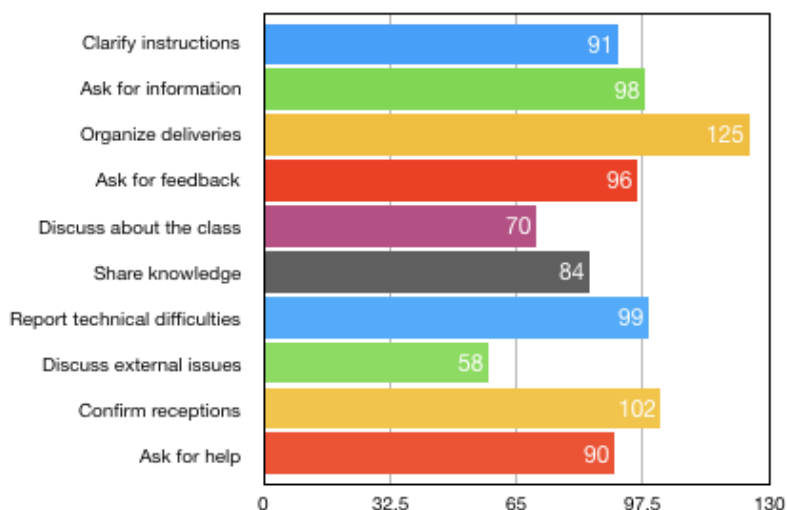


Figure 2. Interactions and intentions: students towards professors via Message.

When asked if they use these tools with any other purpose when interacting with their teacher, most students answered no (283, 92.18%), while a minority said otherwise (24, 7.82%),. Among the examples of purposes commented by the students who answered positively, the following were found: “schedule a tutoring appointment”, “share ideas about the expectations of the course”, “ask if there are going to be classes”, “comment on a topic for the teacher to schedule his next class”, “be aware of everything I have to do”, and “when I have doubts about a classroom at the beginning of classes”.

VII.III. Interactions and intentions: students towards other students

Focusing on the interactions that occur between students, the participants indicated that they are more commonly given through the Forum (171, 55%), followed by the Message tool (125, 40%).

Regarding the frequency with which these interactions occur through the forum, the students pointed out that they are usually carried out less than once a week (almost never, 85, 27.69%), followed at least once a week (sometimes, 55, 17.92%), two to four times a week (27, 8.79%) and rarely more than four times a week (always, 4, 1.30%), while about half said not to take it to It is not at all (136, 44.30%).

On the other hand, the message was used by students to interact with their peers with a general frequency of less than once a week (72, 23.45%), followed at least once a week (37, 12.05%), two to four times a week (12, 3.91%) and to a lesser extent more than four times a week (4, 1.30%), being important to note that more than half (182, 60%) do not use this means to interact with other students.

Specifying the purpose for which they make use of the forum when communicating with their peers, the students affirmed that this is mainly to participate in discussions (171, 55%), exchange information (133, 43%), answer some questions (130, 42%), share data (104, 33%), compare answers (101, 32%), verify instructions (82, 26%), organize in work teams (79, 25%), ask for suggestions (61, 20%), ask for help (61, 19%) and to a lesser extent to discuss matters outside that class (47, 15%), which is shown in Fig. number three.

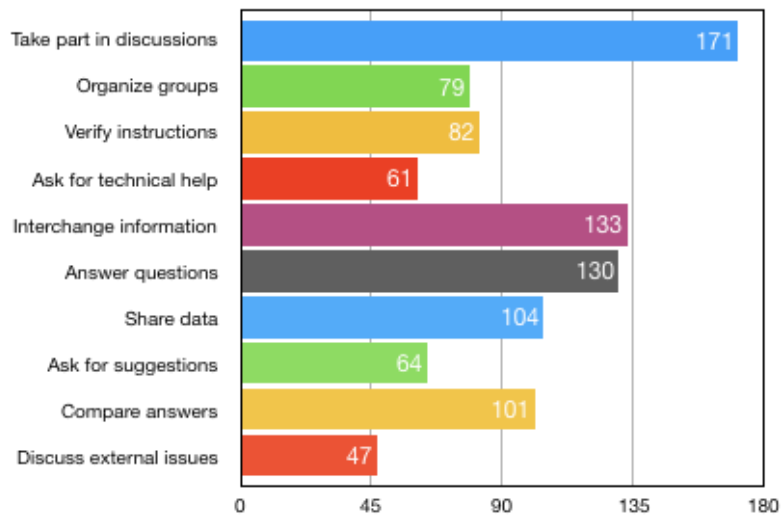


Figure 3. Interactions and intentions: students towards other students in a Forum.

On the other hand, students claimed to use messages with the following purposes, in order of frequency: answer a question (91, 29%), participate in a discussion (88, 28%), exchange information (81, 26%), organize team work (73, 23%), compare answers (69, 22%), verify instructions (66, 21%), share data (63, 20%), ask for suggestions (62, 20%), request help (61, 19%) and finally to discuss matters outside that class (54, 17%). This is presented in Fig. number four.

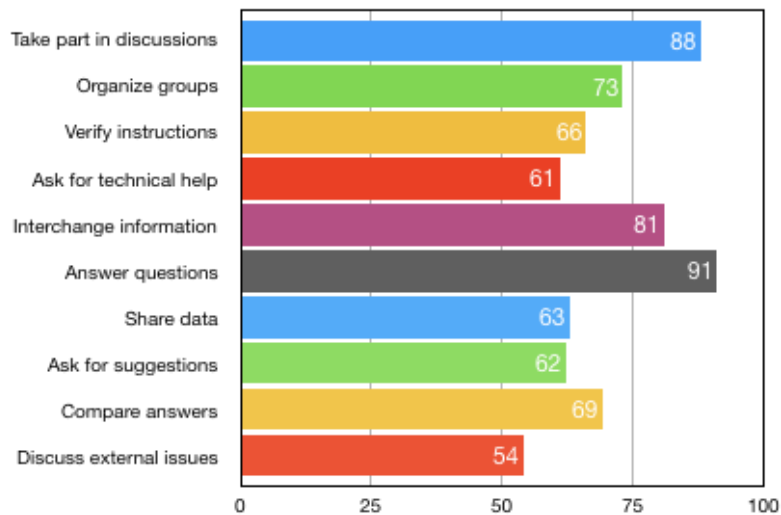


Figure 4. Interactions and intentions: students towards other students via Message.

Regarding whether they use these tools for any other purpose when interacting with their classmates, the students remarked that they generally do not (279, 90.88%), with a minority answering this affirmatively (28, 9.12%). Some of the purposes indicated by the students who answered affirmatively are: “to ask them to reply to messages from other platforms or ask them to review a task”. “maintain a communication through this means in order to improve our ability in this platform”, “when I have to contact a partner and I do not have how to do it”, and “just to send us a greeting when we're bored”.

VII.IV. Interactions and intentions: professors towards students

On the frequency with which their teachers use these tools to communicate with them, students stated that usually through the forum (218, 71%), while a smaller amount through the message (161, 52%).

Specifying the frequency with which these interactions occur within the forum, most of the students remarked less than once a week (almost never, 111, 36.16%), followed by at least once a week (sometimes, 68, 22.15%), two to four times a week (frequently, 33, 10.75%) and to a lesser extent more than four times a week (always, 6, 1.95%), however, a third of them commented that they do not use this medium (never, 89, 28.99%).

Regarding the message tool, students pointed out the following frequencies: never (146, 47.56%), less than once a week (almost never, 88, 28.66%), at least once a week (sometimes, 45, 14.66%), from two to four

times a week (frequently, 23, 7.49%) and more than four times a week (always, 5, 1.63%).

Regarding the purpose of these interactions through the forum, students commented that their professors use it mainly to moderate debates (176, 57%), provide data (174, 56%), discuss the delivery of work (170, 55%), give feedback (149, 48%), answer questions (145, 47%), suggest techniques (140, 45%), clarify concepts (127, 41%), motivate participation (117, 38%), maintain order (91, 29%) and to a lesser extent to discuss issues outside of that particular class (56, 18%), which can be seen in Fig. number five.

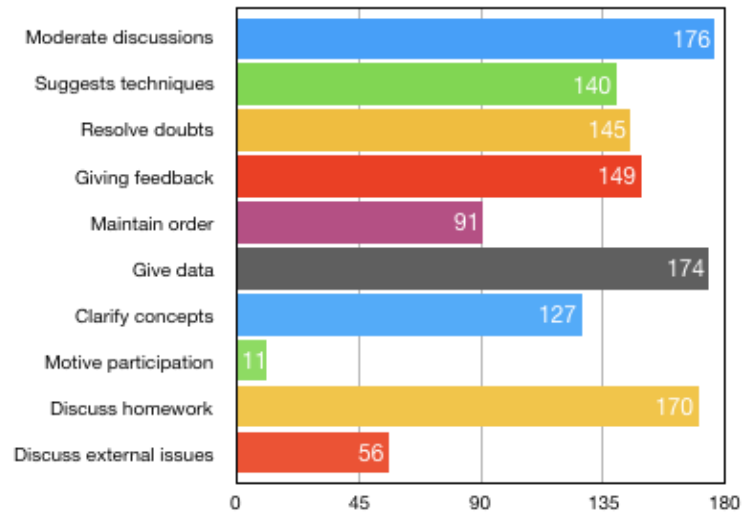


Figure 5. Interactions and intentions: professors towards students in a Forum.

Meanwhile, in the case of the purposes with which their professors make use of the Message tool, the students commented that it is mainly used to discuss the delivery of papers (140, 45%), answer questions (137, 44%), provide feedback (129, 42%), provide data (122, 39%), moderate debates (109, 35%), suggest techniques (100, 32%), motivate participation (84, 27%), maintain order (76, 24%) and to a lesser extent to discuss matters unrelated to that particular class (57, 18%), which can be corroborated with Fig. number six.

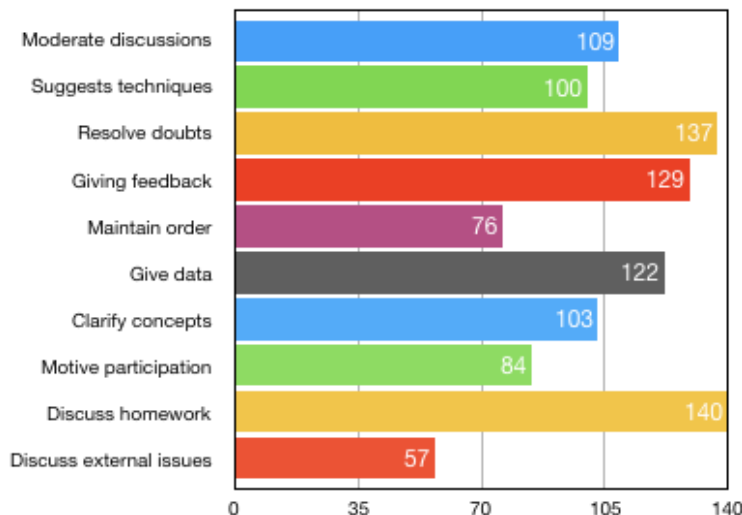


Figure 6. Interactions and intentions: professors towards students via Message.

Regarding whether their teachers use these tools for any other purpose when interacting with them, students commented that generally (277, 90.23%), while the remaining minority answered otherwise (30, 9.77%). Some of these other purposes mentioned by the students are: “notify of any unforeseen event, like if the professor arrives late about 10 minutes, or warns that he had a setback and will not be able to attend classes”, “to notify us about any situation, remind us delivery dates or invite us to an activity on the subject”, “to give notices about the subject, tasks, etc.”, and “on some occasions we are asked to send our research documents to the forum to share with colleagues, at other times we are asked to share visual material”.

VII.V. Perception

Students do not perceive that the use of UADY Virtual has significantly affected their interactions with the teacher, since they indicated that they disagree slightly with the following statements: it allows the teacher to motivate participation (2,932), encourage work (2,886), give suggestions (2.84), accompany the student in their formative processes (2,788), reflect on the presented topics (2,713), support for the resolution of technical difficulties (2,697) and tasks (2,642), solve doubts (2,596) and solve problems (2,586); while they were neutral to the idea that technologies provide greater access to feedback (3.195), as can be seen in Fig. number seven.

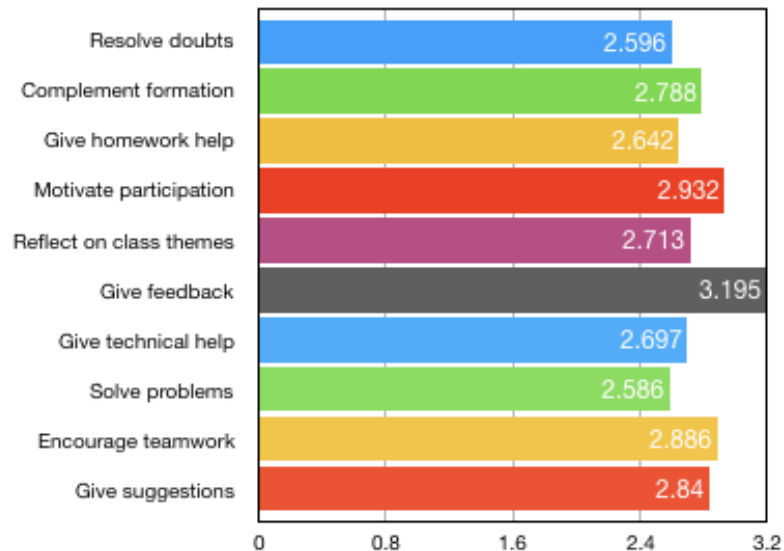


Figure 7. Students perception of the impact of UADY Virtual on their interactions with professors.

In the case of the perception of the impact of interactions through UADY Virtual with their peers, they were considered by the students to be insignificant, as they disagreed slightly with the following statements: I enjoy working with my colleagues by these means (2.365), it allows me to organize myself for the delivery of tasks (2.332), it motivates me to learn (2.225), I receive support to work the contents of the course (2.192), it allows me to improve communication with my classmates (2,156) and it helps me communicate outside the classroom (2,016), which can be corroborated with Fig. number eight.

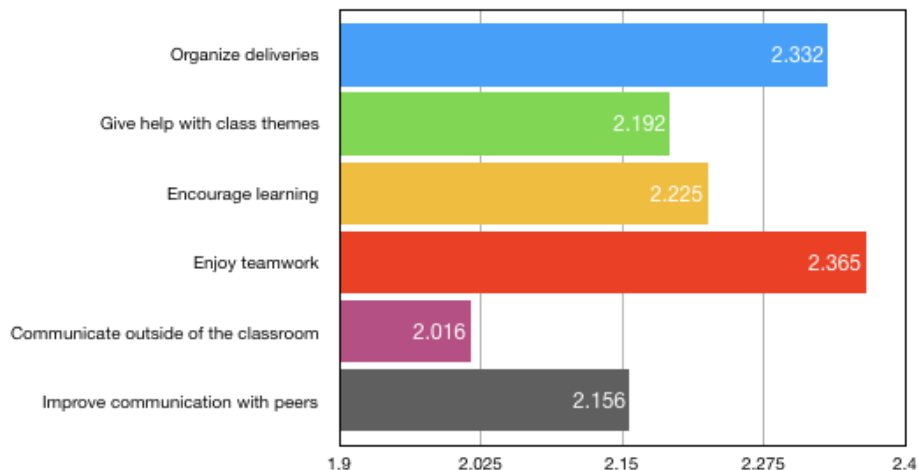


Figure 8. Students perception of the impact of UADY Virtual on their interactions with their peers.

VIII. Results

Based on the results obtained, it is possible to infer that the UADY Virtual system promotes interactions between teachers and their students, as well as between students and their classmates. Among the advantages that this system presents for the training processes is its ability to keep the student informed with his teacher and his classmates, despite being outside the classroom, both synchronously and asynchronously, allowing him to adjust his work processes to your times and needs; as well as providing the teacher means to send the student work materials or feedback.

However, for these processes to be given in a beneficial way, the teacher is required to devote a considerable amount of time to work within the system, both previously during the planning and programming of the contents, and during the course to provide the student with immediate feedback to the participants, so that they find motivating the use of the system and not simply as another task to fulfill. It is necessary to focus efforts to verify that the tools available within the system are adjusted to the needs of the students, so that they do not feel the need to use external means, such as Facebook or WhatsApp, being the integration of these services the platform a possible solution to this problem.

On the other hand, the interactions within UADY Virtual are limited to those that arise at the initiative of the teacher, that is, they start from some instruction provided by the same, and that students prefer to use external sites, such as social networks, to interact with their classmates regarding the activities of the course, and ask the teachers to create work groups in them, because they consider UADY Virtual as complicated to use.

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