

APPENDIX 1: online questionnaire "Knowledge and use of Web 2.0 tools by instructors"

This survey is anonymous and aims to know your opinion about the Web 2.0 tools and their use in teaching.

1. Academic degree:

- Bachelor
- Licentiate
- M.Sc.
- Ph.D.

2. Time served: _____(years, months)

3. Sex:

- Female
- Male

4. According to your knowledge, which is a definition for Web 2.0?

- I have never heard the term
- I have heard the term but I do not know its meaning
- Set of technologies, services and tools to collaborate and participate in the creation of content, knowledge generation and sharing information online.
- Set of programs used on the Internet 2.0, which is part of a consortium that develops applications and technologies for transferring information to a high speed.
- Set of tools, which uses the Internet 2.0 technology and are used by academic, industrial and governmental institutions worldwide.

5. How do you access Internet? You can choose several options.

- I connect at home
- I connect at the University
- I use 3G or 4G from the cell phone providers
- I use free Wi Fi at different places
- Other: _____

6. Which type of electronic device you use to connect to the Internet? You can choose several options.

- I use a desktop at the University
- I use a desktop at home
- I use my portable computer
- I use my own tablet
- I use a cell phone
- Other: _____

7. Please rate your satisfaction regarding the Internet connection you use.

	Very satisfied	Somewhat satisfied	Neither satisfied nor dissatisfied	Somewhat dissatisfied	Very dissatisfied
University Connection	o	o	o	o	o
University Wi Fi	o	o	o	o	o
Home connection	o	o	o	o	o
Free Wi Fi	o	o	o	o	o
3G/4G service	o	o	o	o	o

8. Which applications you use in your daily life? You can choose several options.

- | | | | | | |
|--------------------------|----------|--------------------------|------------|--------------------------|--------------|
| <input type="checkbox"/> | Facebook | <input type="checkbox"/> | GoogleDocs | <input type="checkbox"/> | YouTube |
| <input type="checkbox"/> | Blogs | <input type="checkbox"/> | Podcasts | <input type="checkbox"/> | Dropbox |
| <input type="checkbox"/> | Wikis | <input type="checkbox"/> | Twitter | <input type="checkbox"/> | Other: _____ |

9. For what do you use the apps? You can choose several options.

- | | |
|--------------------------|--|
| <input type="checkbox"/> | For socializing |
| <input type="checkbox"/> | For playing |
| <input type="checkbox"/> | To create and share documents, pictures and videos |
| <input type="checkbox"/> | For news |
| <input type="checkbox"/> | For following famous people, artists, sports, etc |
| <input type="checkbox"/> | For learning |
| <input type="checkbox"/> | For listening to music |
| <input type="checkbox"/> | Other: _____ |

10. How many hours per week you spend using the apps?

	0	1-3	3-6	6-9	9-12	≥12
Facebook	o	o	o	o	o	o
Twitter	o	o	o	o	o	o
YouTube	o	o	o	o	o	o
Blogs	o	o	o	o	o	o
Wikis	o	o	o	o	o	o
GoogleDocs	o	o	o	o	o	o
Podcast	o	o	o	o	o	o
Dropbox	o	o	o	o	o	o

11. How easy to use are the technologies for you?

	Very easy	Easy	Difficult	Very Difficult	I have not use them
Facebook	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Twitter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
YouTube	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Blogs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wikis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
GoogleDocs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Podcast	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dropbox	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

12. Have you used any of the former enlisted apps in your classes?

<input type="checkbox"/>	Moodle	<input type="checkbox"/>	Wikis	<input type="checkbox"/>	Twitter
<input type="checkbox"/>	Facebook	<input type="checkbox"/>	GoogleDocs	<input type="checkbox"/>	YouTube
<input type="checkbox"/>	Blogs	<input type="checkbox"/>	Podcast	<input type="checkbox"/>	Dropbox
<input type="checkbox"/>	Other				

13. Do you think that the apps are useful for the teaching-learning process?

Yes, I have utilized them in courses and are useful
 Yes, however I have not used them in my lectures
 No, I have used them but they are not.
 No, I have not used them however I think there are not useful

14. Would you be willing to use Web 2.0 tools for teaching in Organic Chemistry courses in a way that the instructor only provides consultancy hour?

Yes, I think it is a good idea
 Yes, however I think the traditional lecture should always be given
 No, I think the traditional lecture must be given
 Other: _____

15. Would you be willing to apply quizzes and examinations via online?

Yes
 No
 Other: _____

APPENDIX 2: online questionnaire "Knowledge and use of Web 2.0 tools by students"

This survey is anonymous and aims to know your opinion about the Web 2.0 tools and their use in teaching.

1. Organic course you are attending:

- Fundamental Organic Chemistry
 Organic Chemistry I

2. Which professional career are you studying?

- Pharmacy
 Food engineering
 Chemical engineering
 Nursing
 Medicine
 Odontology
 Biology
 Microbiology
 Agronomy
 Agricultural engineering
 Zootechnics
 Education
 Physical therapy
 Nutrition
 Other: _____

4. Age: _____(years)

5. Sex: Female
 Male

6. According to your knowledge, which is a definition for Web 2.0?

- I have never heard the term
 I have heard the term but I do not know its meaning
 Set of technologies, services and tools to collaborate and participate in the creation of content, knowledge generation and sharing information online.
 Set of programs used on the Internet 2.0, which is part of a consortium that develops applications and technologies for transferring information to a high speed.
 Set of tools, which uses the Internet 2.0 technology and are used by academic, industrial and governmental institutions worldwide.

7. How do you access Internet? You can choose several options.

- I connect at home
 I connect at the University
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8. Which type of electronic device you use to connect to the Internet? You can choose several options.

- I use a desktop at the University
- I use a desktop at home
- I use my portable computer
- I use my own tablet
- I use a cell phone
- Other: _____

9. Please rate your satisfaction regarding the Internet connection you use.

	Very satisfied	Somewhat satisfied	Neither satisfied nor dissatisfied	Somewhat dissatisfied	Very dissatisfied
University Connection	o	o	o	o	o
University Wi Fi	o	o	o	o	o
Home connection	o	o	o	o	o
Free Wi Fi	o	o	o	o	o
3G/4G service	o	o	o	o	o

10. Which applications you use in your daily life? You can choose several options.

- | | | |
|-----------------------------------|-------------------------------------|---------------------------------------|
| <input type="checkbox"/> Facebook | <input type="checkbox"/> GoogleDocs | <input type="checkbox"/> YouTube |
| <input type="checkbox"/> Blogs | <input type="checkbox"/> Podcasts | <input type="checkbox"/> Dropbox |
| <input type="checkbox"/> Wikis | <input type="checkbox"/> Twitter | <input type="checkbox"/> Other: _____ |

11. For what do you use the apps? You can choose several options.

- For socializing
- For playing
- To create and share documents, pictures and videos
- For news
- For following famous people, artists, sports, etc
- For learning
- For listening to music
- Other: _____

12. How many hours per week you spend using the apps?

	0	1-3	3-6	6-9	9-12	≥12
Facebook	o	o	o	o	o	o
Twitter	o	o	o	o	o	o
YouTube	o	o	o	o	o	o
Blogs	o	o	o	o	o	o
Wikis	o	o	o	o	o	o
GoogleDocs	o	o	o	o	o	o
Podcast	o	o	o	o	o	o
Dropbox	o	o	o	o	o	o

13. How easy to use are the technologies for you?

	Very easy	Easy	Difficult	Very Difficult	I have not use them
Facebook	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Twitter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
YouTube	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Blogs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wikis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
GoogleDocs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Podcast	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dropbox	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

14. Have you used any of the former enlisted apps in the courses at the University? You can choose several options.

<input type="checkbox"/>	Facebook	<input type="checkbox"/>	GoogleDocs	<input type="checkbox"/>	YouTube
<input type="checkbox"/>	Blogs	<input type="checkbox"/>	Podcasts	<input type="checkbox"/>	Dropbox
<input type="checkbox"/>	Wikis	<input type="checkbox"/>	Twitter	<input type="checkbox"/>	Other: _____

15. Do you think that the apps are support your learning process?

- Yes, I have utilized them in courses and are useful
 Yes, however I have not used them
 No, I have used them but they are not
 No, I don't think there are useful

16. Would you be willing to use Web 2.0 tools in Organic Chemistry courses in a way that the instructor only provides consultancy hour?

- Yes, I think it is a good idea
 Yes, however I think the traditional lecture should always be given
 No, I think the traditional lecture must be given
 Other: _____

17. Would you be willing to have quizzes and examinations via online?

- Yes
 No
 Other: _____

APPENDIX 3: online questionnaire "Diagnostic questionnaire of previous knowledge in Chemistry"

This survey is anonymous and aims to know your previous knowledge in Chemistry.

1. According to your knowledge, which atoms are isotopes?

- a. ^{12}C and ^{13}C
 b. Hydrogen, deuterium and tritium
 c. Atoms in both items a. and b. are isotopes
 d. None of the above

2. The number of bonds an atom usually forms is called "valence". The valence of carbon, nitrogen and oxygen is:

- a. 6, 7 and 8
- b. 2, 3 and 4
- c. 4, 5 and 6
- d. None of the above

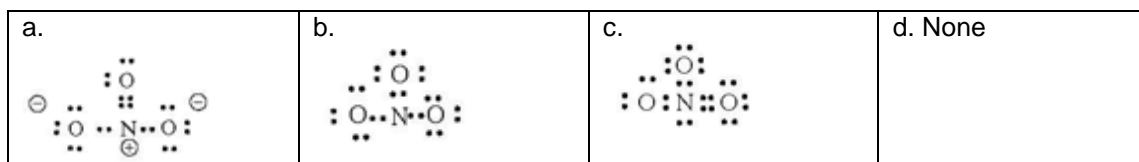
3. Which compound has a covalent bonding:

- a. LiF
- b. NaCl
- c. CCl₄
- d. None of the above

4. The electronic configuration of carbon is:

- a. 1s²2s²2p³
- b. 1s²2s²2p⁴
- c. 1s²2s²2p¹
- d. None of the above

5. Choose the correct Lewis structure of nitric acid:



6. What is an isomer?

- a. An element with a different number of neutrons
- b. Molecules with different physical properties
- c. Molecules with the same molecular formula but different structure
- d. Molecules with the same shape and size

7. Which is the strongest acid?

- a. HF
- b. HCl
- c. HBr
- d. H₂S

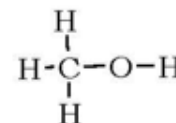
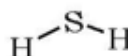
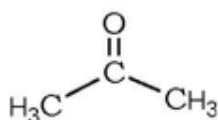
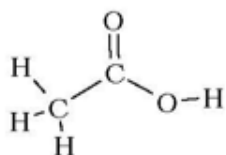
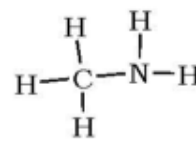
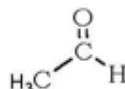
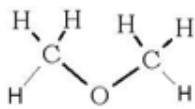
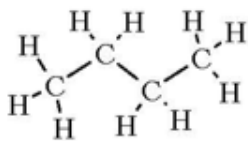
8. Classify each compound, molecule or mixture according to: neutral (N), acidic (Ac), alkaline (Al), oxidizing agent (OA) or reducing agent (RA):

- | | | |
|---|--|----------------------------------|
| <input type="checkbox"/> Sodium bicarbonate | <input type="checkbox"/> Commercial chlorine | <input type="checkbox"/> liquor |
| <input type="checkbox"/> Zinc sheets | <input type="checkbox"/> Orange juice | <input type="checkbox"/> Vinegar |

9. If you have pure water at 0 °C, and you warm it and measure the pH at different temperatures, what do you expect?:

- The pH increases when the temperature is increased
- The pH decreases when the temperature is increased
- The temperature does not affect the pH
- None of the above

10. From the following molecules, choose:



- Two molecules whose bigger interaction force is dipole-dipole: _____
- Two molecules which can form hydrogen bond: _____
- Two molecules which are soluble in water: _____
- Two molecules which are soluble in hexane: _____

11. Which is the geometry of the molecule $\text{H}_3\text{C-S(=O)CH}_3$ around the sulphur atom?

- Linear geometry
- Trigonal geometry
- Tetrahedral geometry
- Octahedral geometry
- None of the above

12. Which compound has the atom with the higher oxidation state?:

- Hydrocarbon
- Alcohol
- Water
- Carboxylic acid

13. The correct order of electronegativity is:

- $\text{H} > \text{He} > \text{Li} > \text{Be}$
- $\text{F} > \text{O} > \text{N} > \text{C}$
- $\text{Ce}^+ > \text{Ce}^{+2} > \text{Ce}^{+3} > \text{Ce}^{+4}$
- $\text{I} > \text{Br} > \text{Cl} > \text{F}$

APPENDIX 4: online questionnaire "Student's opinion after the use of Web 2.0 tools in Organic Chemistry courses"

This survey is anonymous and aims to know your opinion about the Web 2.0 tools after you used them in the Organic Chemistry course.

1. Organic course you are attending:

- Fundamental Organic Chemistry
 Organic Chemistry I

2. Which professional career are you studying?

- Pharmacy
 Food engineering
 Chemical engineering
 Nursing
 Medicine
 Odontology
 Biology
 Microbiology
 Agronomy
 Agricultural engineering
 Zootechnics
 Education
 Physical therapy
 Nutrition
 Other: _____

4. Age: _____ (years)

5. Sex: Female
 Male

6. How easy was for you to use the Blog "<http://organica-eq-ucr.blogspot.com/>"?

- Very easy
 Easy
 Difficult
 Very difficult
 I did not use the Blog
 Other: _____

7. If you don't use the Blog, please could you tell us why?

8. Do you think the Blog helped you with the learning and understanding of the basic concepts of Organic Chemistry?

- Yes
 No
 Other: _____

9. How easy was for you to use the videos from the Blog?

- Very easy
- Easy
- Difficult
- Very difficult
- I did not watched the videos
- Other: _____

10. If you don't use the videos, please could you tell us why?

11. Do you think the videos helped you with the learning and understanding of the basic concepts of Organic Chemistry?

- Yes
- No
- Other: _____

12. Do you consider appropriate to use the Blogs and videos in education?

- Yes
- No
- Other: _____

13. Do you think that Moodle help you with the learning and understanding of the basic concepts of Organic Chemistry?

- Yes
- No
- Other: _____

14. Please explain your answer to the previous question:

15. Which other tools do you think could be useful in education?

- Facebook
- Wikis
- GoogleDocs
- Podcast
- Twitter
- Dropbox
- Other: _____
- None: _____

16. If you wish to make any comments regarding the Web 2.0 in the Organic Chemistry courses, please use the space below:

APPENDIX 5: Results from test 1 (diagnostic test)

Table 1. Student ratings obtained in the diagnostic test (Test 1) before the intervention.

Subject	Correct answer (%)
Isotopes	31
Valence electrons	93
Isomers	70
Covalent bond	87
Electronic configuration	78
Sorting by electronegativity	91
Geometry of molecules	63
Oxidation state	42
Lewis structures	21
pH meaning	25
Solubility in water	65
Solubility in hexane	42
Dipole-dipole interaction	16
Hydrogen bonds	48
Acidity and basicity	38
Sodium bicarbonate basicity	71
Oxidative capacity of	26
Basicity of potash lye	62
Neutrality of a liquor	28
Redox capacity of zinc-	62
Orange juice acidity	69
Vinegar acidity	80
Neutrality of fuels	37