



User reactions to business model changes (MAU/DAU)

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User reactions to business model changes (MAU/DAU)

The client

Udacity: A Massive Open Online Course program aspiring to make access to high quality coding and technology tutorials equitable and profitable

01

Context

Since launching in 2014, Udacity amassed a large, devoted user base. However, in 2015, Udacity rolled out a new 'freemium' business model, with both free and paid content.

02

Issue

How does this change in business model affect user behavior?

03

The ask

Track usage statistics in the months following the change to the business model, including:

1. Course completion
2. Number of courses attempted, and
3. Projects completed

Use social listening channels to identify pain points and opportunities in the learner's own words

Identify our user groups and define targeting priorities

Report on Udacity daily engagement dataset

(<https://www.kaggle.com/datasets/austenmy/udacity-daily-engagement>)

Assumptions and meta information

1. The following is a report on a published event-based user behavior dataset from 2015 (prepared for this portfolio)
2. The dataset contains records from a few months after Udacity changed its business model from 'free' to 'freemium'. As best I could, I based storytelling and recommendations around the product *as it had existed in Q4 2014 through 2015*.
3. However, screenshots of the product are from 2026.
4. External references, like quotations, are not confined to pre-2016.
5. Big caveat: Current Udacity customers are *not defined explicitly in the dataset*. Instead, customers are defined here by evidence of project completion, which requires a paid subscription. The number of Customers is likely an underestimate. The actual number of customers in the dataset is unknown/unknowable from what information was provided.
6. Finally, notes *about the presentation itself* are presented in figures like the one here:



This is a comment about the presentation itself / my thought process

Udacity

State of the user



Summary of key findings

Udacity just switched from a 'free' model to a subscription-based 'freemium' model betting that access to experts (project evaluation, help with material, pacing guidance) would justify this change.

The good

- 1/ **Monthly Active Users is up:** MAU has almost doubled in the past 9 months for Customers, specifically; MAU increased among non-paying users since March 2015. The switch to a 'Freemium' model has not hurt our MAU.
- 2/ **We have a great product:** Most users spend hours on our platform and complete dozens of lessons, suggesting they know our product well and value the education it provides. We're sticking to our lofty educational goals and people are noticing.

Where to improve

- 1/ **Caught up in free samples:** Our biggest hurdle is the "why buy?" mentality many free users have (and potentially customers, too!) Users know our content is great, but need a push to subscribe to customers-only perks.
- 2/ **Revolving door student body:** MAU among Customers has steadily declined since March, 2015 (though still up overall from Nov '14), and 'Stickiness' (the proportion of Daily Active Users to MAU) has steadily declined for this population over this 9-month period. 'Stickiness' for other user segments is consistent, but low.

Our monthly-subscription model may financially penalize long-tail engagement among Customers and scare away free users.

Roadmap

1/

Our product

- Change in business model
- Introducing Nanodegrees
- Framing the question: How is our User base evolving?

2/

Usage statistics

- Monthly average users, stickiness
- Usage by segment

3/

Our Users, in detail

- Introducing our user segments
- Explorers & Dabblers
- Avid Learners & 'Freemium' Pros
- Customers

4/

Reflection

- Revisiting usage statistics
- Summary of findings
- Next steps

5/

Appendix

- User comparison chart
- Data preparation
- Variables used, engineered
- Details of cluster analysis

We rolled out some big changes in 2014

We expect our students and customers to react

'Free' model

Q2 2014 and earlier

- ✓ Course access
- ✓ Quizzes / activities
- ✓ In-class projects
- ✓ Certificate of completion

'Freemium' model

Q3 2014 - present

- ★ ✓ Course access, new courses added
- ✓ Quizzes / activities
- In-class projects
- Verified certificate of completion
- ★ Project feedback and code reviews
- ★ Personal guidance from a coach
- ★ Personalized pacing support

★ = new feature
✓ = free component

Our stand-alone courses are now reorganized into Nanodegrees for subscribers

Non-subscribers have access to select individual courses

The screenshot displays the 'Program Outline' for the 'Data Analyst Nanodegree Program'. At the top, it shows '5 courses', '20 lessons', and '3 projects'. The first course is 'Welcome to the Data Analyst Nanodegree Program'. The second course, 'Introduction to Data Analysis with Pandas and NumPy', is expanded, showing a list of lessons: 'The Data Analysis Process', 'Jupyter Notebooks', 'Exploring and Inspecting Data', 'Manipulating Data using Pandas and NumPy', and 'Communicating Results'. Below the lessons is a project titled 'Investigate a Dataset'. Callouts with arrows point to specific elements: one points to the '5 courses' header, another to the 'Introduction to Data Analysis with Pandas and NumPy' course title, a third to the 'Jupyter Notebooks' lesson, and a fourth to the 'Investigate a Dataset' project. To the right of the screenshot, four text boxes provide context: 'Nanodegrees contain one or more courses', 'Non-subscribers users may take a limited range of free stand-alone courses', 'Each course contains one or more lessons', and 'Each course contains one project'.

Program Outline 5 courses 20 lessons 3 projects

Course 1: Welcome to the Data Analyst Nanodegree Program

Course 2: Introduction to Data Analysis with Pandas and NumPy

Learn the data analysis process of questioning, wrangling, exploring, analyzing, and communicating data. You will work with data in Python using libraries like NumPy and pandas. 14 hours

- L1 The Data Analysis Process: Learn about the data analysis process and the Python packages used in this course
- L2 Jupyter Notebooks: Jupyter Notebooks are a great tool for sharing insights and visualizations alongside your code. This lesson covers how to create them and utilize their various features.
- L3 Exploring and Inspecting Data: Use the pandas library to load data, view its properties, and start asking data analysis questions
- L4 Manipulating Data using Pandas and NumPy: Use the pandas library to perform data cleaning, filtering, and reshaping tasks. This includes troubleshooting issues with data as well as optimizing for memory usage and speed.
- L5 Communicating Results: Draw conclusions and communicate results to stakeholders by calculating statistics and creating basic data visualizations with the pandas library

P Investigate a Dataset: Choose one of Udacity's curated datasets, perform an investigation, and share your findings.

Course 3: Advanced Data Wrangling

Nanodegrees contain one or more courses

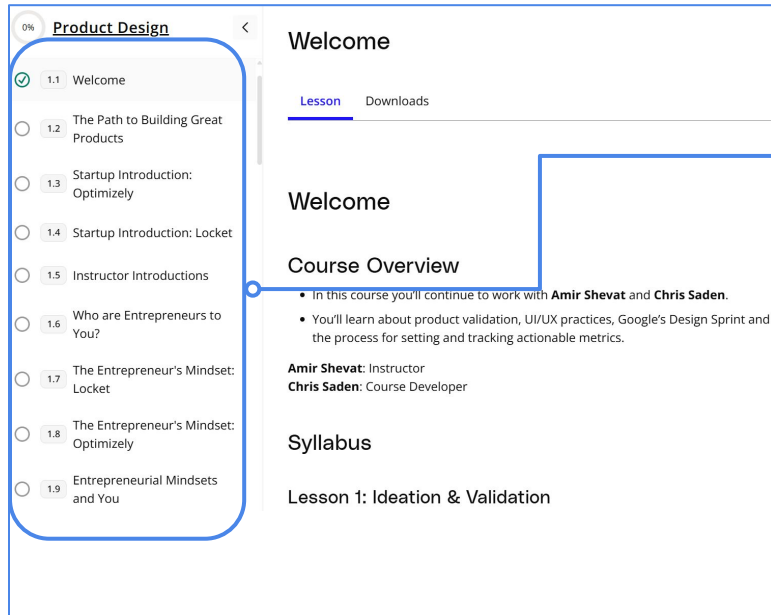
Non-subscribers users may take a limited range of free stand-alone courses

Each course contains one or more lessons

Each course contains one project

Fig.1. Screenshot of Udacity's *Data Analyst Nanodegree Program* landing page (taken March 2026.)

Lessons themselves are broken up into bite sized learnings



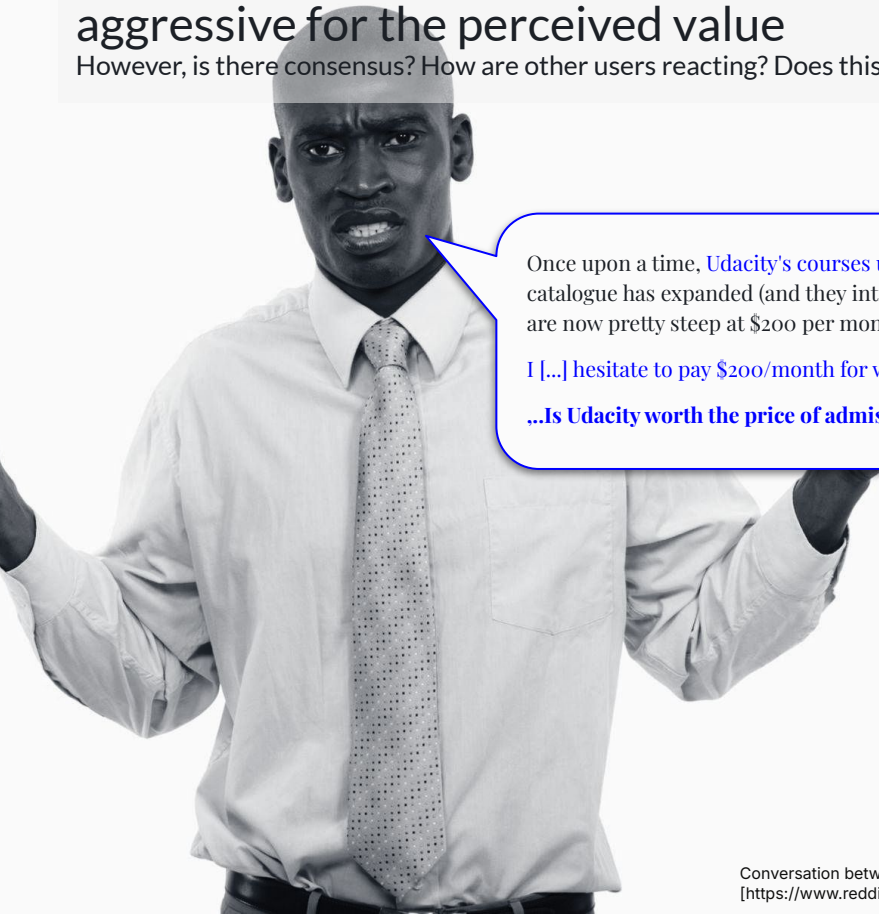
Each lesson has several 'sub-lessons', which include:

1. Written text (syllabi, course material)
2. Video explainers
3. Quizzes and activities

Fig.2. Screenshot of Udacity's *Product Design* individual course Lesson outline (taken March 2026.)

Our users have noticed these changes, with some finding the pricing model too aggressive for the perceived value

However, is there consensus? How are other users reacting? Does this affect their usage behavior?



Once upon a time, **Udacity's courses used to be free**. But ever since their course catalogue has expanded (and they introduced these 'nanodegrees') their courses are now pretty steep at \$200 per month. **So, that's \$2400 per years. Per course.**

I [...] hesitate to pay \$200/month for what amounts to an online course.

...Is Udacity worth the price of admission?

Each course's full price would itself allow access to a project, so I don't think it's an accident that the Nanodegree has the same monthly price as full access to one course. The **courses themselves are all still free**, it's **just you pay for a project and coaching for each one**.

You could **just take the Web Development and Javascript courses for free** and **create your own projects** based on the material you've learned.

Core question

Udacity just switched from a 'free' model to a subscription-based 'freemium' model betting that access to experts (project evaluation, help with material, pacing guidance) would justify this change.

- 1/ What is the state of the user? What is their reaction to this new model?
- 2/ What improvements can be made to product to add value, increase project completion rate, and encourage more subscriptions/renewals?

- balanced with -

- 3/ What improvements can be made that underscore our company values, namely, our commitment to equitable access to lifelong learning?





Usage Statistics

The overall number of users is up, though retention presents a challenge

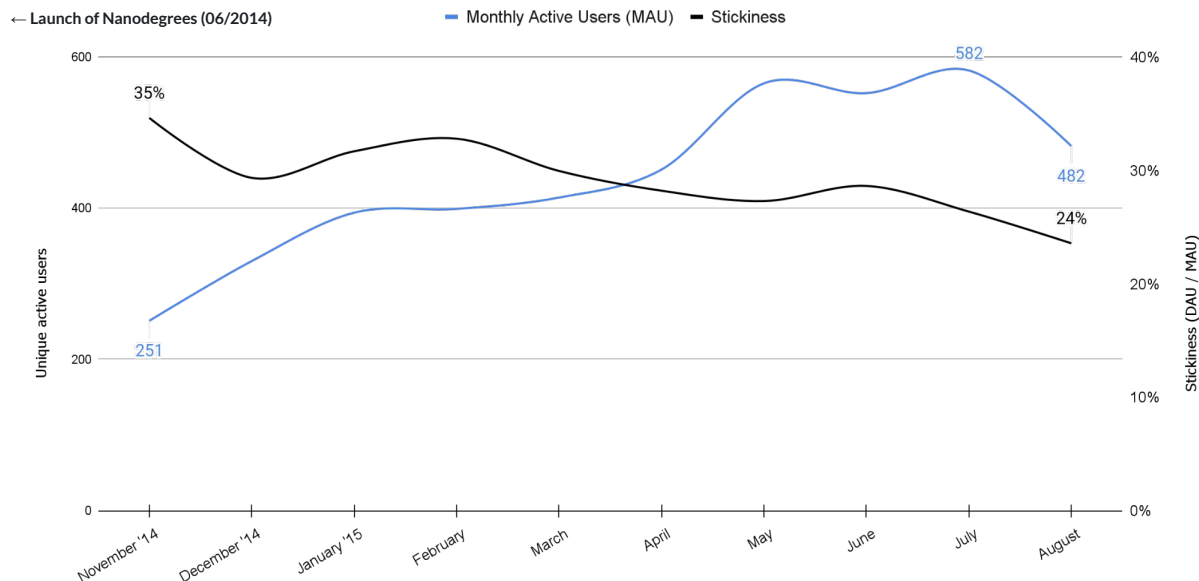


Fig. 3. Monthly Active Users (MAU) plotted against 'Stickiness' (Daily Active Users (DAU) / MAU). DAU calculated as the month's-end average number of daily users. Both MAU and DAU are defined with reference to users who spent at least one minute on the platform or completed a lesson or project.

Since the launch of Nanodegrees, additional free courses, and the new pricing structure, activity has largely seen month-over-month increases in the past 9 months.

Despite a dip in August we see an overall 192% increase in monthly active users (MAU) since November '14.

However, the proportion of daily active users (DAU) to MAU ('stickiness') has steadily declined.

Users may not find long term value in our platform and disengage, creating a revolving door of users

... But who is leaving?

Digging deeper, a cluster analysis reveals different behaviors among users

but all seem jolted—good and bad—by a mysterious event in March 2015

← Launch of Nanodegrees (06/2014)

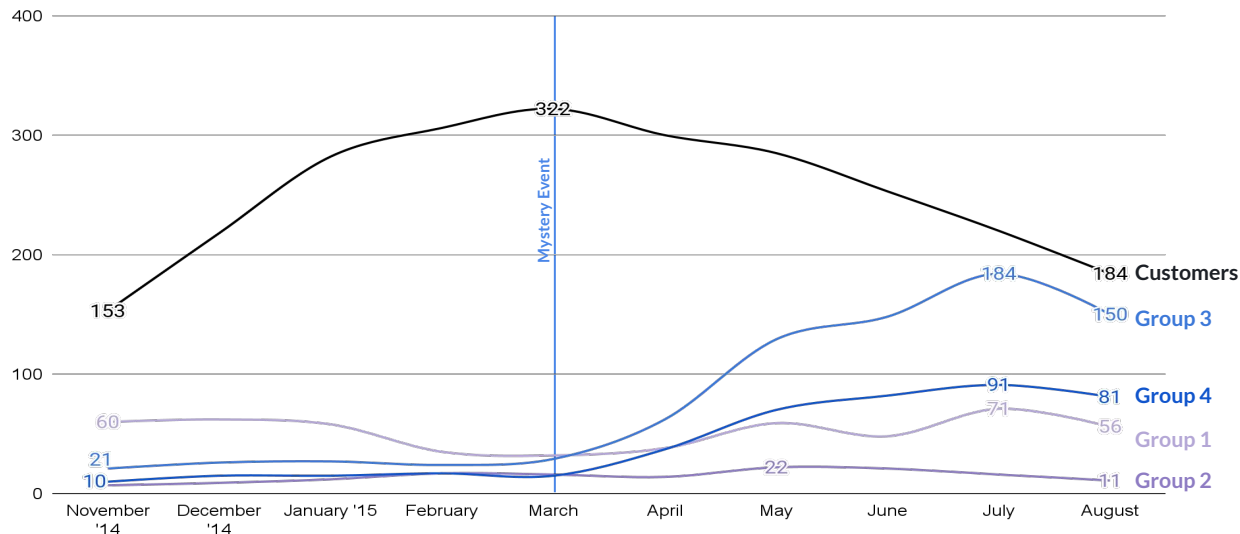


Fig. 4. Monthly Active Users (MAU) per user segment.

Before March 2015:

MAU increases among Customers

The launch of Nanodegrees may have triggered an increase in users

MAU for other segments is consistently low, despite the expansion of free course offerings.

After March 2015:

MAU decreases among Customers, but increases for other groups, notably Groups 3 and 4.

A similar story emerges when users are split by cohort (2-month windows).



I couldn't find any announcement on Udacity's blog/in tech reviews of that time that announce any major changes to Udacity in February/March. More investigation warranted.

Stickiness remains largely stagnant and low for Groups 1 - 4, declines for Customers

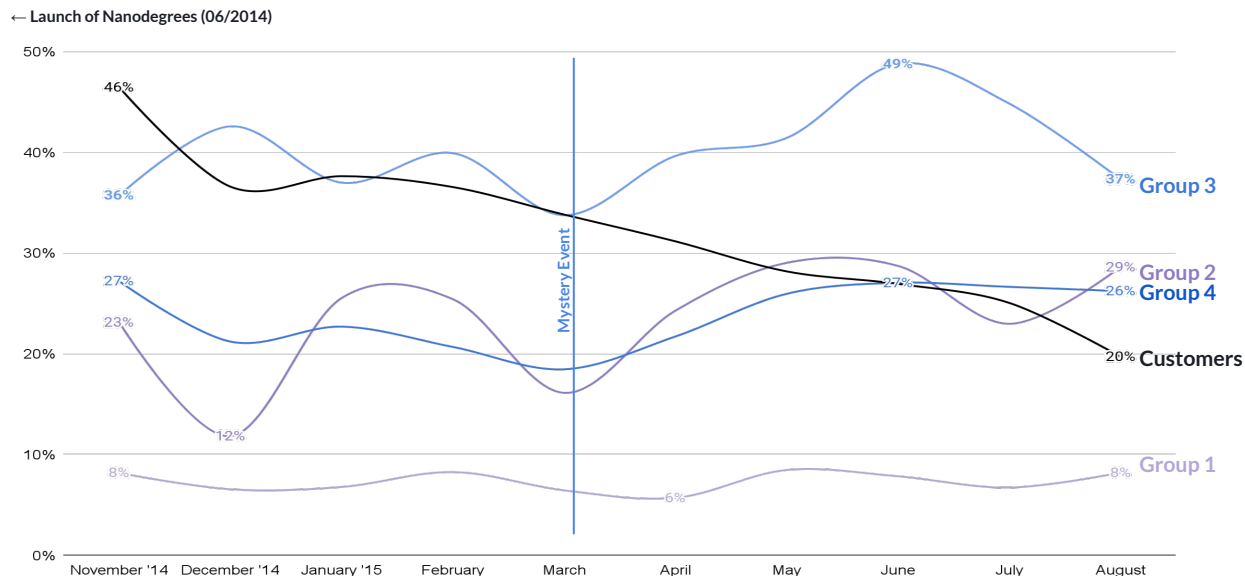


Fig. 5. 'Stickiness' over time. 'Stickiness' is defined as average month-end daily users divided by the total count of monthly average users.

By contrast, there is no pre-/post-March story for 'stickiness,' which remains stagnant and low for Groups 1, 2 and 4. Group 3 is the highest of all groups and peaks near 50%, but returns to Nov '14 levels by August '15.

For Customers, we see an almost precipitous decline in stickiness over these 9 months (-245% from Nov 2014 to August 2015).

Occasional users may not be receiving or perceiving the best value of our platform: We recommend evenly-paced learning (i.e., daily logins) for best results

Understanding our users and their behavior may shed light on these usage statistics.



Our Users

Explorers • Dabblers • Avid Learners • Freemium Pros • Customers

Meet our users

Users fall into 5 distinct groups based on their behaviors or Udacity membership

Group 1
Explorers



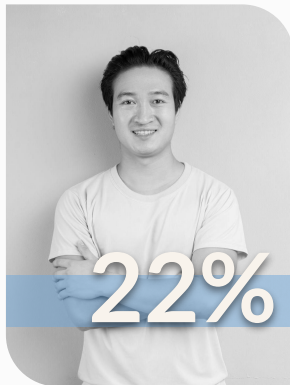
“I’m trying a few courses to see which one’s right for me. I’ve watched some videos so far, but haven’t yet actually completed a lesson.

Group 2
Dabblers



“I’m starting to get serious about 1 or 2 courses, but haven’t gotten far in my learning yet. I may struggle with the course materials.

Group 3
Avid learners



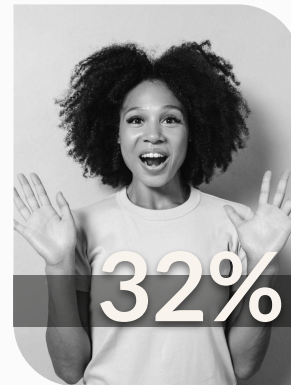
“I’m ready to commit to a few lessons, and I’ll stick with Udacity for a few weeks. I may not see the benefit of a paid subscription yet.

Group 4
‘Freemium’ pros



“I’m heavily committed to learning on Udacity and know how to take advantage of the system: I value the skills I can learn, but I don’t want to commit financially.

Group 5
Customers[†]



“I work hard and commit the days and hours necessary to complete projects and further my learning. Once I’ve finished, though, I may leave Udacity behind.

Quotes are constructed from quantitative and qualitative user behavior detailed across the next several slides.

*Base n = 1,168; Sixty-nine users (approx. 5.5% of total sample, n = 1,237) did not complete any lessons, complete any projects, or spend any time on Udacity aside from creating an account/logging in. These users were removed from analysis

† Customers are defined as users who completed at least one project as project completion requires a paid subscription. However, there may be customers who nevertheless have not completed a project. As such, 18% is likely an underestimate of our customer base.



JUMP TO METHODS
for details of cluster analysis

Explorers

33%

Ending MAU: ↘56
Ending Stickiness: →8%

On average, Explorers spend a few days bouncing around Udacity.

While they may attempt a few lessons, few Explorers actually complete one. Some may just be scoping things out, but others may grind their gears in Courses that are not at their level.

While we expect many Explorers to come and go, those spending the most time with us may evolve into Dabblers or even Customers.



'Scan or study' option for whoever's reading

Lessons completed, avg (std)

↓ 0.6 (1.4)

Min:	Q1:	Med.	Q3:	Max:
0	0	0	1	9

Time per lesson in mins, avg (std)

↓ 82.4 (79.0)

Min:	Q1:	Med.	Q3:	Max:
2	21	54	120	378

Days on Udacity, avg (std)

↓ 2.8 (2.6)

Min:	Q1:	Med.	Q3:	Max:
1	1	2	3	13

Time per day in mins, avg (std)

↓ 37.5 (28.3)

Min:	Q1:	Med.	Q3:	Max:
2	15	31	53	122

Arrows and colors represent significant differences at an alpha = 0.05 level *without* correction. Statistical model was a 1-sample t-test against the all-group mean (base n = 1,168)

Dabblers

5%

Ending MAU: ↘11
Ending Stickiness: →29%

Dabblers are well on their way: They've completed a few lessons and have devoted hours to our platform across nearly 3 weeks, on average.

Dabblers spend more time on lessons than any other group, perhaps reflecting difficulty with course material (even when accounting for outliers).

Shepherding Dabblers into the right courses may help them graduate to more advanced usage or a subscription.

Lessons completed, avg (std)

↓ 3.3 (3.4)

Min:	Q1:	Med.	Q3:	Max:
0	1	2	5	14

Days on Udacity, avg (std)

↓ 19.7 (2.6)

Min:	Q1:	Med.	Q3:	Max:
3	8	13	29	70

Time per lesson in mins, avg (std)

↑ 501.5 (201.6)

Min:	Q1:	Med.	Q3:	Max:
295	393	463	534	1,589

Time per day in mins, avg (std)

79.2 (24.0)

Min:	Q1:	Med.	Q3:	Max:
36	64	72	92	137

Explorers and Dabblers may balk at our lesson format, not yet see the value of our coaching services, or be stymied by a price barrier



“ [T]he lecture segments are very brief, with most lasting around a minute or less. **The sum total of the video content in the third lesson on convnets is less than 15 minutes.**

“ "Deep Learning" is clearly **lacking substance** as **concepts are introduced very superficially in about 5 min** before you are expected to implement these methods in assignments.

“ "Deep Learning" is rated as a advanced class and has a **long list of requirements**. But even taking these into consideration, **the class itself does not provide sufficient explanations for new concepts** introduced here...

“ The programming assignments ... are **lacking in instruction**... You likely won't be able to make much progress on the assignments without prior knowledge of machine learning and TensorFlow or **doing a lot of extra research outside of the course materials**.

“ I think this course is awesome! However, this course is **not meant for beginners** in the [Reinforcement Learning] domain. **I recommend taking David Silver's free online lectures** before this course. I am experimenting that mixture and **both courses complement superbly**. This course is a more advanced and fast-paced course... compared to standard RL literature. - Anonymous, 2018, Reinforcement Learning

Explorers and Dabblers feel that short format videos do not adequately prepare them for quizzes and assignments

Prerequisites may not be informative enough for Explorers and Dabblers to decide what level--basic, intermediate, advanced--they're at and what skills they need to bring with them to succeed.

Even if they enjoy our content, some users report leaving our platform or supplementing our materials with other online courses when struggling with lesson concepts and assignments.



Quotes were pulled from Quora, Reddit and Class Central. Several different courses are reviewed here, mostly from 2014 - 2016 (but some more modern)

Lessons completed, avg (std)

↓ 12.3 (7.0)

Min:	Q1:	Med.	Q3:	Max:
0	7	11	17	36

Days on Udacity, avg (std)

↓ 23.9 (12.2)

Min:	Q1:	Med.	Q3:	Max:
1	15	23	33	55

Time per lesson in mins, avg (std)

185.3 (74.4)

Min:	Q1:	Med.	Q3:	Max:
53	127	171	235	441

Time per day in mins, avg (std)

↑ 95.0 (39.0)

Min:	Q1:	Med.	Q3:	Max:
38	67	85	111	247

22%

Avid Learners

Ending MAU: ↘150
Ending Stickiness: ↘37%

Avid Learners are starting to get into the groove. They devote an hour and a half per day to learning on Udacity and, like Dabblers, spend around 3 weeks with us.

Unlike Dabblers, Avid Learners complete a dozen lessons, or about a Course-worth of work.

As our 'stickiest' group, what can we do to earn their subscription?

Lessons completed, avg (std)

↑ 26.8 (12.0)

Min:	Q1:	Med.	Q3:	Max:
9	19	24	34	67

Days on Udacity, avg (std)

↑ 52.0 (20.2)

Min:	Q1:	Med.	Q3:	Max:
18	38	51	64	167

Time per lesson in mins, avg (std)

↑ 231.2 (123.4)

Min:	Q1:	Med.	Q3:	Max:
49	169	208	277	1,040

Time per day in mins, avg (std)

↑ 112.1 (45.2)

Min:	Q1:	Med.	Q3:	Max:
49	82	103	138	331

9%

‘Freemium’ Pros

Ending MAU: ↘81
Ending Stickiness: →26%

‘Freemium’ Pros are expert navigators of short-term learning opportunities without the commitment of a subscription. They spend on average just shy of two months with us, and devote nearly 2 hours per day to our lessons.

Like Avid Learners, they have completed a Course or two’s worth of work.

How do we convert these super users to super customers?

Avid Learners and 'Freemium' Pros are likely already advanced students

A review of our course catalog with an eye for difficulty level across free and paid-only courses may reveal what users think about our 'free sample.'



“Extremely **slow paced**, with **most of the topics handwaved**. I've read Sutton's [the instructor's] book. Topics (not all) from the book were covered on a **shallow level**.

Additional topics were explained [such that] you need to read other resources in order to actually implement them.

“I couldn't make it through the first week. The pace is very slow and the course doesn't seem to be very thorough.

Maybe it's a good idea for people that are not very bright and have no knowledge whatsoever on the topic. – Anonymous, 2016, Reinforcement Learning

“While **some sections are paced far too slowly**, others **rocket ahead** without even preparing the students for the concepts they quiz you on.

“For **math or computer science students**, I'd imagine this **course would drag** and then suddenly become more what they're used to. **For everyone else, avoid.** – Kevin C Murray, 2018, Reinforcement Learning

“In the end, you likely end up **spending hours on additional research using outside resources** before you will be able to solve most of the problems stated in the assignments ... **what [is] the benefit of taking this Udacity class?**

Avid Learners and 'Freemium' Pros are most likely already well versed in many of our subject offers.

Yet, difficulties finding the right course persist, with many comments mentioning slow pacing, and information being both too shallow and too complicated both within and between courses.

Some find difficult figuring out who exactly a class is for

Leaving the platform to find supplemental information has some wondering what the value of Udacity is, despite the availability of our paid coaching services.

Lessons completed, avg (std)

↑ 30.3 (14.9)

Min:	Q1:	Med.	Q3:	Max:
0	18	29	42.8	75

Days on Udacity, avg (std)

↑ 64.3 (31.5)

Min:	Q1:	Med.	Q3:	Max:
7	41	60	80	171

Time per lesson in mins, avg (std)

↑ 207.3 (101.3)

Min:	Q1:	Med.	Q3:	Max:
53	150	183	239	1,270

Time per day in mins, avg (std)

↑ 91.8 (28.2)

Min:	Q1:	Med.	Q3:	Max:
22	71	87	108	223

33%

Customers

Ending MAU: ↘184
Ending Stickiness: ↘20%

Unsurprisingly, Customers spend the most time with us across (a) total days in our system and (b) average time per day, and have completed the most lessons.

However, Customers complete on average just 2.5 projects. Although it's impossible to tell how many unique courses they've attempted, this project average seems low, suggesting that Customers sleep on one of our most important core benefits. They may leave us as a result.

Customers have issues with Course projects and expert feedback

They do not even mention our other selling points



“

I give Model Building and Validation 3.5 out of 5 stars: Good. Admittedly, **I did not do the final project** that involves creating a fraud detection model, which could take a significant chunk of time. – Gregory J Hamel 2016, Model Building and Validation

“

Don't pay for the enrollment, all of **the course material is free..** Their **mentor feedback wasn't that great.** When I got stuck on a project, they just kept sending redundant nonconstructive information, like, "Hey you're doing a great job check out this link – David, 2016, Intro to CS

“

Felt like buying a car with all the extras that you won't use. For 10 to 20x the cost of other providers i do not recommend Udacity model. Either go for something cheaper for knowledge acquisition or save for a master/ post- grad... – Anonymous, 2018, Data Analyst Nanodegree

“

[T]he worst part is, Nanodegree content is unlocked only for couple of months, I can't access it anymore. Huge waste of money. – Anonymous, 2016, Deep Learning Nanodegree

“

I never got past the first lesson, it was very hard to figure out what I needed to do. – Anonymous, 2016, Deep Learning Nanodegree

Projects aren't a big motivator for some Customers, while others found that feedback from our experts was not worth the cost of the subscription.

Despite the fact that we advertise close partnership with leading tech firms and top universities, like Google and Stanford, and indeed many of our instructors come from these institutions, some students find that the project reviews do not meet these set standards

Some lament that subscription-bound access to course content is a “huge waste of money”

As with other segments, finding the appropriate course remains challenging.

But it's not all bad news: Many Customers love us

The challenge comes from understanding how to effectively communicate these benefits to non-subscribers and, critically, understand why Customers are leaving us anyway



“

All I can say is wow. **If you want to watch a master,** irrespective of your experience as Python programmer. **Peter Norvig is someone you will want to learn with.** Each week his lesson explored different concepts in computer science. His lectures had a different theme each week and made for a very interesting experience. – Anonymous, 2013, Design of Computer Programs

“

One of the strengths of this course is its **emphasis on hands-on learning.** Throughout the modules, there are numerous coding exercises and assignments that allow learners to implement machine learning algorithms using popular libraries such as scikit-learn or TensorFlow. This **practical approach enables students to gain practical experience** and develop their skills in applying machine learning techniques to **real-world problems.** – Jasmitha Kolamuri, 2024, Machine Learning Fundamentals

“

Very **entertaining.** Both **challenging** and **fun.** Can be **useful** to get the gist of programming and algorithms, learn some advanced Python tricks, and find some nice general solutions to problems and puzzles of varying difficulty. – Mauro Lacy, Design of Computer Programs, 2016

For some courses, Customers are impressed by the quality of the lessons and even more so by the top talent presenting the material. Instructors are often called out by name when Customers laud a class.

Customers celebrate that quizzes, assignments and projects are couched in real-world problems.

But just as many leave generic positive reviews, failing to connect their Course experiences to our Customer-exclusive benefits.



Reflection



Revisiting usage statistics, we see that Customer MAU is in decline while MAU for other users surges past March 2015

Customers may not see enduring value with a subscription past course completion, while our ever-broadening course catalog / Course improvements may attract non-paying users. Understanding whether Customers become Avid Learners or 'Freemium' Pros may provide insight here. The March, 2015 mystery still remains.

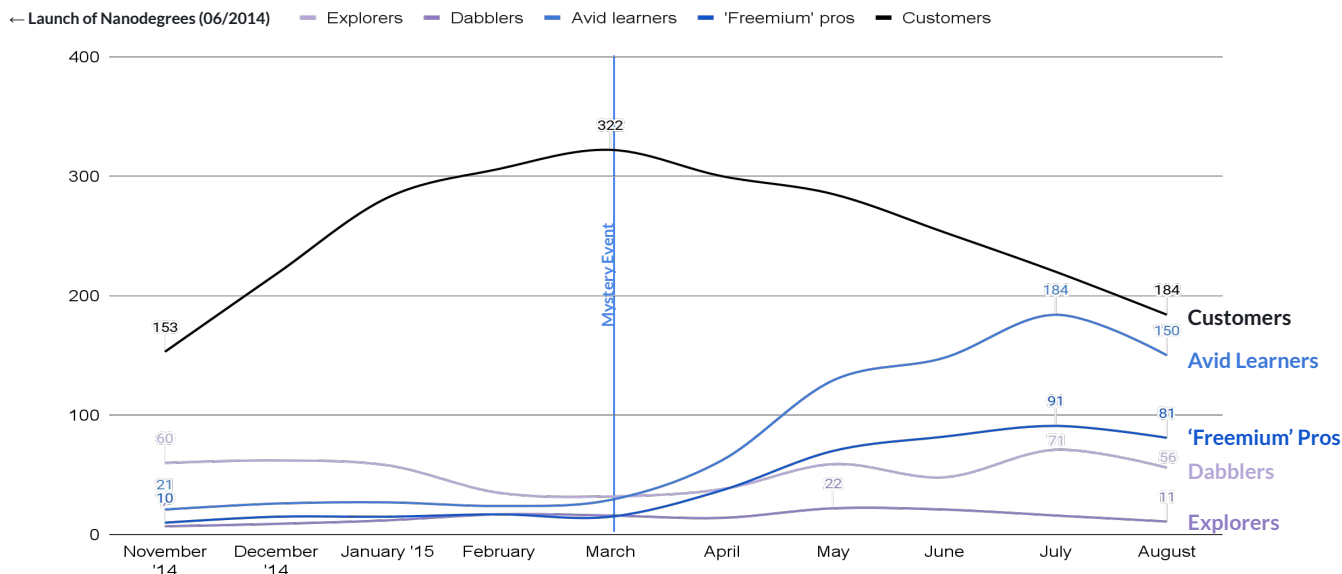


Fig. 5'. Monthly Active Users (MAU) per user segment.

Stickiness remains stagnant and low for free Users, while it declines for Customers.

Again, Customers may not see enduring value with a subscription past course completion, while our ever-broadening course catalog / Course improvements may attract non-paying users. Understanding why Avid Learners and 'Freemium' Pros exhibit the desired learning behavior yet are "ABD" is crucial.

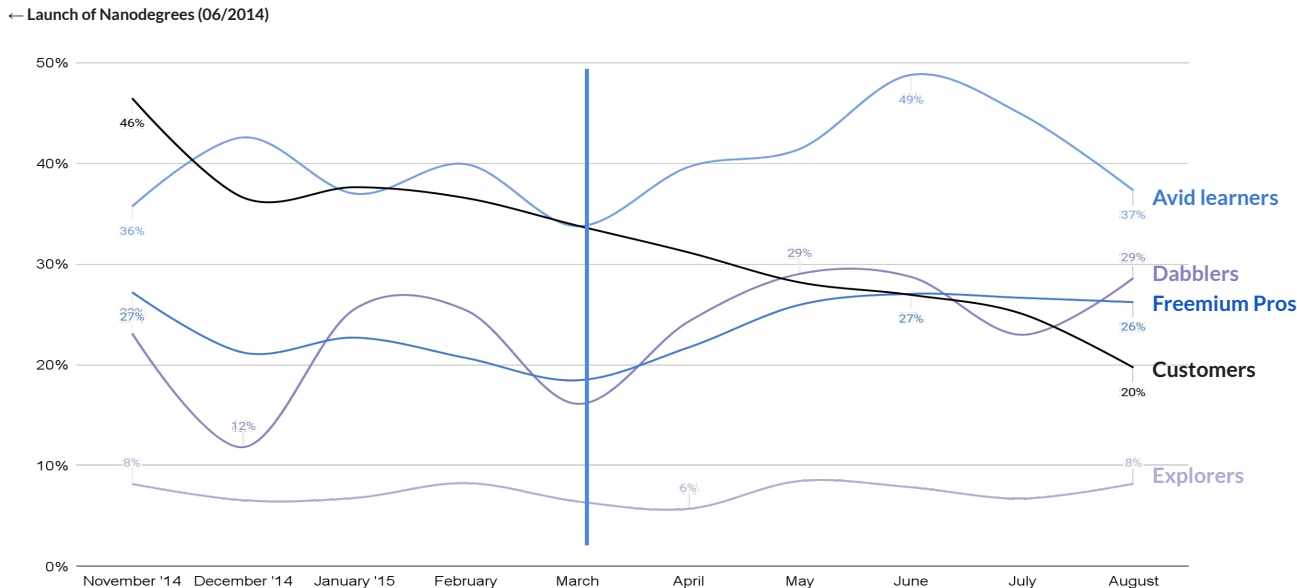


Fig. 6: 'Stickiness' over time. 'Stickiness' is defined as average month-end daily users divided by the total count of monthly average users.

Reflection

Udacity just switched from a 'free' model to a subscription-based 'freemium' model betting that access to experts (project evaluation, help with material, pacing guidance) would justify this change.

1/ What is the state of the user? What is their reaction to this new model?

All things told, Monthly Active Users has almost doubled in the past 9 months.

The overall increase of students demonstrates our company's commitment to equitable learning solutions, even with the rollout of paid access to Nanodegrees/full course access.

MAU has increased for Customers, specifically. However, MAU among Customers has steadily declined since March, 2015, and 'Stickiness' (Daily Active Users /MAU) has steadily declined for this population over this 9-month period.

At the same time, MAU increased among non-paying users, particularly 'Freemium' Pros and Avid Learners (together 30% of users) since March 2015, with stickiness levels remaining constant.



Reflection

Udacity just switched from a 'free' model to a subscription-based 'freemium' model betting that access to experts (project evaluation, help with material, pacing guidance) would justify this change.

1/ What is the state of the user? What is their reaction to this new model?

Our users fall into 5 distinct categories, depending on whether they're customers or what behaviors they exhibit across our platform.

Most users spend a lot of time on our platform, indicating that users value our product.

However, users differ in how many Lessons they complete, how many days/hours they commit, and--through reviews on other websites--in their readiness and motivations for our Courses.

These differences may explain the evolving MAU and stickiness scores we observed over the past 9 months



Next Steps

Given the changes in usage across groups over the past 9 months, gathering more data is crucial to retain Customers and convert non-paying users.

- 2/ **What improvements can be made to product to add value, increase project completion rate, and encourage more subscriptions/renewals?**

A. Triage the bleeding: Find out why Customers are leaving our platform

While the announcement of the Nanodegree, additional courses, and other changes may have initially drawn a lot of new customers, our customer base may be reverting back to pre-Nanodegree levels. Three avenues to explore include:

- a/ **Understanding when Customers leave** (e.g. *After how many Nanodegrees? or How many days after their last project?*) may shed light on when/whether Customers receive the full value of our offer. Can we postpone when Customers feel 'done?'
- b/ **Understanding how/whether Customers value our paid-only entitlements** may help make these elements indispensable. How many of our customers become 'Freemium' Pros or Avid Learners?
- c/ **Understanding what happened in March 2015**, a catalyst event, may inform what changes we keep and any backpedalling we may need to do.

We only have data from 9 months. User behavior may be cyclic or otherwise may vary by time of year.

While it may be tempting to compare the past 9 months to previous years, the change in business model makes this year's data incomparable. Our best course of action may be to wait until more data is available.



Next Steps

Given the changes in usage across groups over the past 9 months, gathering more data is crucial to retain Customers and convert non-paying users.

- 2/ **What improvements can be made to product to add value, increase project completion rate, and encourage more subscriptions/renewals?**

B. Revisit incentives for subscribing: How do we convert Avid Learners and 'Freemium' Pros, 31% of our user base, to Customers?

We currently offer:

- a/ 50% off if you finish the nanodegree
- b/ Access to pacing guidance
- c/ Access to coaching
- d/ Code/project review at the end of each course

How do we make our subscriber-only perks must-haves? These more advanced users may not see the value in these offerings, especially if they can self-serve on projects, coaching and pacing.



Next Steps

Given the changes in usage across groups over the past 9 months, gathering more data is crucial to retain Customers and convert non-paying users.

- 2/ **What improvements can be made to product to add value, increase project completion rate, and encourage more subscriptions/renewals?**

C. Review (free) course materials: Quality is top of mind across all consumer segments.

- a/ **Understanding the value of our 'free trial':** Are our free lessons as good quality / fairly represent the quality of our paid-only courses?
- b/ **Understanding browsing behavior:** Is the process of finding relevant courses that are skill-appropriate seamless?



Nutrition Facts

Serving Size 2 pieces (3g)

Servings 6

Calories 5

Amount/Serving %DV

Total Fat 0g 0%

Sodium 0mg 0%

Total Carb. 2g 1%

Sugars 0g

Sugar Alcohol 2g

Protein 0g

Not a significant source
of nutrients

APPENDIX

Percent Daily Values (DV) are

User snapshot

	 Explorers	 Dabblers	 Avid Learners	 'Freemium' Pros	 Customers
Total number of days on platform*	2	20	24	52	63
Avg overall time investment in mins*	122	1,590	2,013	5,396	5,796
Avg # lessons completed*	<1	3	12	27	30
Avg # projects completed	-	-	-	-	2
Number of courses visited (avg)*	1 - 4 (1.3)	1 - 1.8 (1.3)	1 - 4 (1.3)	1 - 2.5 (1.3)	0.8 - 1.67 (1.2)
Max streak in days*	1	4	4	10	8
Average streak in days	<1	1	1	2	2
Number of streaks	2	9	11	17	26
Avg time per day in mins*	37	79	95	112	91
Avg time per lesson in mins*	82	501	185	231	207
Count (n)	389	53	252	104	370
Percent of users	33%	5%	22%	9%	32%

*Variable used in cluster analysis

Data preparation

Cleaning:

Rows with 0s across *num_courses_visited*, *lessons_completed*, *projects_completed* and *total_minutes_visited* were removed as errant entries. After all relevant rows were removed, data from 1,168 unique users (down from 1,237) were analyzed

acct	utc_date	num_courses_visited	total_minutes_visited	lessons_completed	projects_completed
0	2015-01-09	1	12	0	0
0	2015-01-10	2	37	0	0
0	2015-01-11	2	54	0	0
0	2015-01-12	1	33	0	0
0	2015-01-13	1	65	0	0
0	2015-01-14	1	152	1	0
0	2015-01-15	1	142	0	0
0	2015-01-16	0	0	0	0
0	2015-01-17	1	10	0	0
0	2015-01-18	1	38	0	0
0	2015-01-19	1	98	1	0
0	2015-01-20	0	0	0	0
0	2015-01-21	0	0	0	0

Variable definitions

Native variables		Engineered variables	
<i>acct</i> , int	Unique account identifier	<i>max_streak</i> , float; <i>avg_streak</i> , float; <i>num_streak</i> , float	The maximum, average and number of access streaks (visits on consecutive days)
<i>utc_date</i> , date	Date of access	<i>tot_num_days</i> , int	Total number of days a user visited Udacity
<i>num_courses_visited</i> , int	Number of courses visited on a given visit	<i>avg_time_per_day</i> , float; <i>avg_time_per_lesson</i> , float	Average time spent on Udacity platform / individual lessons
<i>total_minutes_visited</i> , float	Length of visit (in minutes)	<i>total_minutes_visited</i> , float	Used in calculation of <i>avg_time_per_{lesson,day}</i>
<i>lessons_completed</i> , int <i>projects_completed</i> , int	Number of lessons / projects completed on a given visit	<i>num_courses_visited</i> , float <i>projects_completed_any</i> , [0,1]	Average number of courses visited per day Used to define paid users

Cluster analysis

Parameters

Inputs: Cluster analysis was performed on non-customers, defined as users who had not completed any projects (n = 949)

Model: Bisecting K Means (implemented in sklearn) model with $n_clusters = 4$, $n_init=10$ and all other parameters default.

Variables:

total_minutes_visited, *max_streak*, *tot_num_days*, *avg_time_per_day*, *avg_time_per_lesson*.

Scaling: All variables were scaled to have 0 mean and unit variance using sklearn's *StandardScaler* (all parameters default)

Silhouette score: 0.4 (weak-moderate clustering)

